VOL. XXIV. NEW YORK—THURSDAY, JUNE 29, 1911—CHICAGO No. 26.

THE AUTOMOBILE

How the Driver May Keep Out of Jail

Some of the Rules for Operating Automobiles

While the law governing automobiling is shadowy and uncertain, the following rules may be stated for what they are worth: First, catch your law. Then try to understand it. When you have done this, put your knowledge into use, and if your conception and obedience to its provisions happen to jibe with the interpretation of the authorities, all is well. If they do not and there is a conflict of opinion, possibly the judicial department may side with you in your interpretation. If not, you may have the satisfaction of knowing that you have established one definite law point. But one excellent plan that may be followed, at least in New York City, is to obey the orders of the traffic squad. Another is to be reasonable and courteous and gentlemanly wherever you may happen to be.

LAW is like an oyster or a banknote; either it is very good or it is verv bad. It is supposed to be based upon common sense, and theoretically at least it should be framed to give the greatest measure of liberty that is conformable to the security of others. There is no such thing as a moderately good oyster or a reasonably good banknote, and in those particulars the oyster and the banknote resemble laws.

The Callan Motor Vehicle Law, enacted last year, is still a statute of the sovereign State of New York. Many of its provisions have been challenged, a few of them have been nullified by the courts and many more are still before the courts.

Consequently the exact status of the automobilist who drives or is driven, is more or less shadowy as far as State jurisdiction is concerned. Added to this uncertainty which covers the State, the status of the automobilist in New York City under the law is still more hazy.

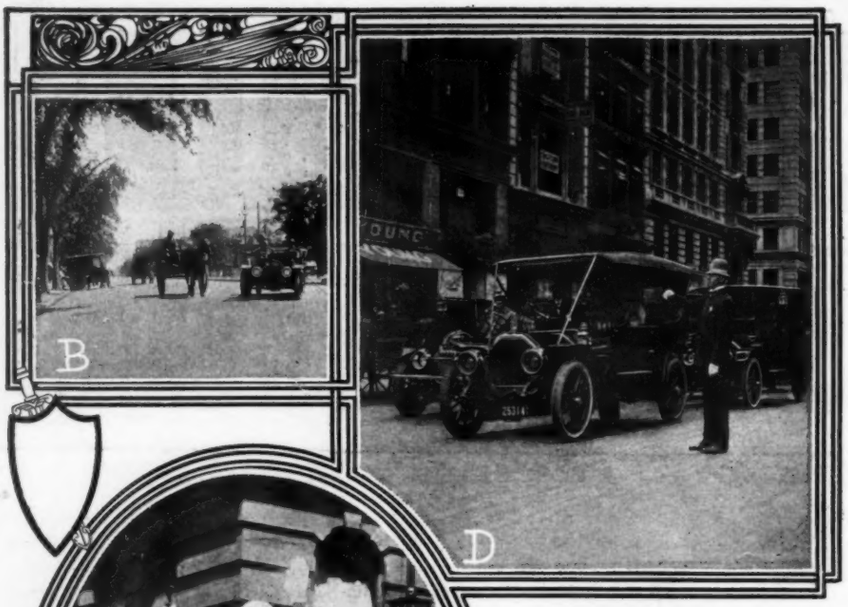
The Callan act provides that a car may be driven only at a safe and reasonable rate of speed and in no case in excess of 30 miles an hour. It regulates the speed limit in cities and villages, requiring that it shall not be more than 15 miles an hour. In cities of the first class the local governing bodies can make the limit of speed anything they please.

In New York City there is an old ordinance on the statute books which was enacted in the days of the horse-drawn vehicle, requiring that the maximum speed of vehicles shall be not more than eight miles an hour.

Thus it is illegal and a misdemeanor, punishable by heavy penalties, to drive an automobile anywhere in the city of New York and its Boroughs at a greater speed than eight miles an hour.

This situation, however, is so preposterous that the law is a dead letter just as any law must be if it offends the good sense of the majority. The New York City law has been superseded by a set of rules for driving and the regulation of street traffic, which was issued some time ago by the police department. This carefully avoids naming the exact legal rate of speed, but under that head it says:

A—Key to the driving situation in New York—the traffic squad policeman



D—Two blasts of the whistle start traffic north and south

B—Correct way of making a right-hand turn, with the arm extended as a warning

C—Stop! When the traffic squad's man uplifts his hand

Sec. 1. No vehicle shall proceed at any time at a greater speed than the law allows and is safe and proper under the conditions then obtaining.

Sec. 2. No vehicle shall cross any street or avenue running north and south or make and turn at a speed rate exceeding one-half its legal speed limit.

Thus it would be possible for a member of the traffic squad to make an arrest for overspeeding if a car was traveling at four miles an hour under such circumstances as would make that rate of speed perilous to human beings or property. On the other hand, it allows the officer to discriminate within rather wide bounds. Nobody is so wild as to suppose that automobiles never reach a rate of twenty miles an hour inside New York City limits. They do often, and the police know it, and no arrests are made unless that rate of speed is unsafe and improper under the circumstances. The same may be said for fifteen and twelve miles an hour.

The police know that the object of all law is to protect life and property and to insure the pursuit of liberty and happiness on the part of the people and not to hamper and vex them with unreasonable regulations. Consequently the traffic officers motion for automobiles to proceed upon their way unless such procedure threatens injury and injustice to others.

"Ignorantia Legis Neminem Excusat," is a fundamental axiom of the law. It is presumed that every man knows the law in all its fine ramifications, and his failure to do so is no excuse for unintentional violations of it. But the automobilist in New York who knows the law knows more than the authorities, because there is a sharp difference in opinion as to its meaning everywhere throughout the fabric of the government, national, State and municipal.

There are those persons who hold that any tax on a motor vehicle in interstate service of whatever kind is unconstitutional and illegal, and that consequently no national law covering the operation of such traffic can be enacted. On the same principle many persons otherwise well informed maintain that State regulation of automobiles is outside the law, discriminatory and unfounded in justice. In fact it is hard to see how a just law could be passed taxing a New York automobile for traveling in New Jersey or Arizona or anywhere in between, while a horse-drawn coach or heavy truck owned in New York may pass unchallenged. The same may be said of automobile operation within the home State.

The automobile is personal property, and many persons hold that if it could be assessed at its fair cash valuation and taxed accordingly that the ends of even justice would be served if it were allowed to be operated anywhere without extra cost of any kind. They also point out that such a spectacle as that recently presented by the great and sovereign State of New Jersey will redound to the good of motordom eventually, because it emphasizes the lengths to which greed and shortsightedness can be made to go.

But as the great statesman once said: "It is a condition and not a theory that now confronts us."

There are automobile laws, and as long as they are laws they should be honored and obeyed.

The Callan Act is about to die, according to the New York State officials. Therefore it may be well to point out a few of the good things that were included in its provisions. In the first place it allowed a maximum speed of thirty miles an hour under safe conditions. Second, it prevented voracious and prejudiced communities from unduly hampering automobile operation by making the speed limit fifteen miles an hour in all cities and villages except those of the first class.

New York City being a city of the first class was allowed to make its own speed limit, and as a high State officer remarked: "And I guess it's up to the police."

Now, referring to the "condition that confronts us," the automobilist operating his car in New York City legally must do as follows in order to keep the peace:

Except when passing a vehicle ahead, he must keep as near the right curb as possible. Meeting another vehicle he must pass to the right; overtaking another, he shall pass to the left and not pull over to the right until well clear. In using a street divided longitudinally he must keep to the right of the line of division. He must not stop with the left side of the car to the curb except in certain defined instances, and while standing still the car must not block traffic. No vehicle shall back to make a turn if by so doing it interferes with other vehicles, but must go around the block or to a street wide enough to make the turn without interfering with others.

In slowing up or stopping, a signal shall be given to those behind by raising the whip or hand vertically.

In turning, while in motion, or in starting to turn from a standstill, a signal shall be given by raising the whip or hand, indicating with it the direction in which the turn is to be made.

Before backing ample warning shall be given, and while backing unceasing vigilance must be exercised not to injure those behind.

One blast of police whistle indicates that north and south traffic shall stop and that east and west traffic may proceed. Two blasts that east and west traffic must stop and that north and south traffic may proceed. Vehicles and street cars must stop so as not to interfere with the passage of pedestrians at the crossings. Three or more blasts is a signal of alarm and indicates the approach of a fire engine or some other danger.

No vehicle shall be used on any street or highway unless provided with lights and sound signals as prescribed by law.

Police, Fire department, Fire Patrol, Traffic Emergency Repair, U. S. Mail vehicles and Ambulances shall have the right of way in any street and through any procession.

Everything being equal, all vehicles and street cars going in a northerly or southerly direction shall have the right of way over all vehicles and street cars going in an easterly or westerly direction.

Street cars shall have the right of way between cross streets, over all other vehicles; and the driver of any vehicle, proceeding upon the track in front of a street car, shall immediately turn out upon signal by the motorman, driver or conductor of the car.

No vehicle or street car shall so occupy any

street as to interfere with or interrupt the passage or other street cars or vehicles.

No vehicle shall stand headed, or be driven, on any street marked by a white arrow sign except in the direction indicated by the arrow; but it may stop at either curb during the hours indicated on the sign, the usual rule of right side to curb being in force at other hours.

No vehicle shall be driven, during crowded traffic hours, on any crosstown street where there are car tracks, except for such distance as may be reasonably necessary to reach the building to which it is going.

A vehicle waiting at the curb shall promptly give place to a vehicle about to take on or let off passengers.

The driver of a vehicle, on the approach of a fire engine or any other fire apparatus, shall immediately draw up said vehicle as near as practicable to the right-hand curb and parallel thereto and bring it to a standstill.

A driver of a vehicle overtaking a street car shall exercise due caution not to interfere with or injure passengers getting on or off said car.

No one shall drive a vehicle that is so covered in or constructed as to prevent the driver thereof from having a sufficient view of the traffic following and at the sides of such vehicle.

No one shall drive or conduct any vehicle in such condition, so constructed, or so loaded as to be likely to cause delay in traffic or accident or injury to man, beast or property.

No one shall so load a vehicle, or drive a vehicle so loaded, with iron or other material that may strike together without its being properly "deafened," so as to cause no unnecessary noise.

No one shall drive a public, numbered, licensed or business vehicle who is less than sixteen years of age.

No one shall ride upon the rear end of any vehicle without the consent of the driver, and when so riding no part of the person's body shall protrude beyond the limits of the vehicle.

The roadbeds of highways and streets are primarily intended for vehicles, but pedestrians have the right to cross them in safety, and drivers of vehicles and street cars must exercise all possible care not to injure pedestrians. Pedestrians should, on their part, never step from the sidewalk to the roadbed without first looking to see what is approaching, and should not, needlessly, interefere with the passage of vehicles or street cars.

By crossing a street as nearly as possible at right angles, preferably at a regular crossing, and when a traffic policeman is stationed there, by waiting for his signal, pedestrians will greatly add to their own safety, facilitate the movement of traffic, and make it much less difficult for the horses, which often have to be reined in suddenly and painfully to avoid careless and unthinking pedestrians. Nothing in the foregoing should excuse drivers from constant vigilance to avoid injury to pedestrians under all conditions.

The word vehicle includes equestrians, led horses and everything on wheels or runners, except street cars and baby carriages.

The word horse includes all domestic animals.

The word driver includes the rider and driver of a horse, the rider of wheels and the operator of a motor driven vehicle or street car.

Drivers of vehicles and street cars must at all times comply with any direction by voice or hand of any member of the Police Force, as to stopping, starting, approaching or departing from any place; the manner of taking up or setting down passengers or loading or unloading goods in any place.

Ignorance of these rules shall furnish no excuse for disregarding them.

The present State law has the following to say as to the rules of the road:

Signaling and other devices; signals; rules of the road. 1. Brakes, horns and lamps, signaling at crossings. Every motor vehicle, operated or driven upon the public highways of this State, shall be provided with adequate brakes in good working order and sufficient to control such vehicle at all times when the same is in use, and a suitable and adequate bell, horn or other device for signaling, and shall, during the period from one-half hour after sunset to one-half hour before sunrise, display at least two lighted lamps on the front and one on the rear of such vehicle, which shall also display a red light visible from the rear. The rays of such rear lamp shall shine upon the number plate carried on the rear of such vehicle in such manner as to render the numerals thereon visible for at least fifty feet in the direction from which the motor vehicle is proceeding. The light of the front lamps shall be visible at least two hundred feet in the direction in which the motor is proceeding. Every person operating or driving a motor vehicle on the public highways of this State shall also, when approaching a cross road outside the limits of a city or incorporated village, slow down the speed of the same and shall sound his bell, horn or other device for signaling in such a manner as to give notice and warning of his approach.

Stopping on signal, and other regulations. A person operating or driving a motor vehicle shall, on signal by raising the hand, from a person riding, leading or driving a horse or horses or other draft animals, bring such motor vehicle immediately to a stop, and, if traveling in the opposite direction, remain stationary so long as may be reasonable to allow such horse or animal to pass, and, if traveling in the same direction, use reasonable caution in thereafter passing such horse or animal; provided that, in case such horse or animal appears badly frightened or the person operating such motor vehicle is so signaled to do, such person shall cause the motor of such vehicle to cease running so long as shall be reasonably necessary to prevent accident and insure the safety of others. In approaching or passing a car of a street railway which has been stopped to allow passengers to alight or embark, the operator of every motor vehicle shall slow down and if it be necessary for the safety of the public he shall bring said vehicle to a full stop. Upon approaching a pedestrian who is upon the traveled part of any highway and not upon a sidewalk, and upon approaching an intersecting highway or a curve or a corner in a highway where the operator's view is obstructed, every person operating a motor vehicle shall slow down and give a timely signal with his bell, horn or other device for signaling.

E—Improper method of making a left-hand turn

F—In turning corners slacken speed and drive as near to the curb as possible

G—One blast of the whistle starts traffic east and west

Rules of the road. Whenever a person operating a motor vehicle shall meet on a public highway any other person riding or driving a horse or horses or other draft animals or any other vehicle, the person so operating such motor vehicle shall reasonably turn the same to the right of the center of such highway so as to pass without interference. Any such person so operating a motor vehicle shall, on overtaking any such horse, animal or other vehicle, pass on the left side thereof, and the rider or driver of such horse, draft animal or vehicle shall, as soon as practicable, turn to the right so as to allow free passage on the left. Any such person so operating a motor vehicle shall, at the intersection of public highways, keep to the right of the intersection of the centers of such highways when turning to the right and pass to the right of such intersection when turning to the left.

According to the officials the new State automobile law will be spread upon the statute books in the immediate future. This law will be effective from and after its signature by Governor Dix and is based in a general way on the framework of the Callan act. Like all other automobile laws, it is open to the same objections that have been raised elsewhere, and while it endeavors to do away with some of the crudities of the parent law, it is only a human product and consequently imperfect.

Various portions of the present act have been contested in the courts, and, although the law has not yet been on the books for a year, one important provision has already been modified so that the registration of chauffeurs is now conducted at less cost to the men, and a determined effort has been made to attack the general constitutionality of the law on broad lines.

In addition to the legal duties placed upon the automobilist there are many ethical requirements in the operation of the car. It is quite possible under any set of laws for an automobilist to make a nuisance of himself on the road without coming in contact with any legal penalty. The "road hog" in a large majority of instances is accountable only to his own conscience for the discomfort he may put upon others. For instance, it is not illegal for the driver of a high-powered car to pick his position on the road and maintain such a distance as to make his fellow-automobilists whose cars are not so highly powered eat his dust.

There is nothing in motoring that approaches this practice in the sense of petty meanness. The law will not reach him and the wrathful driver and passengers in the

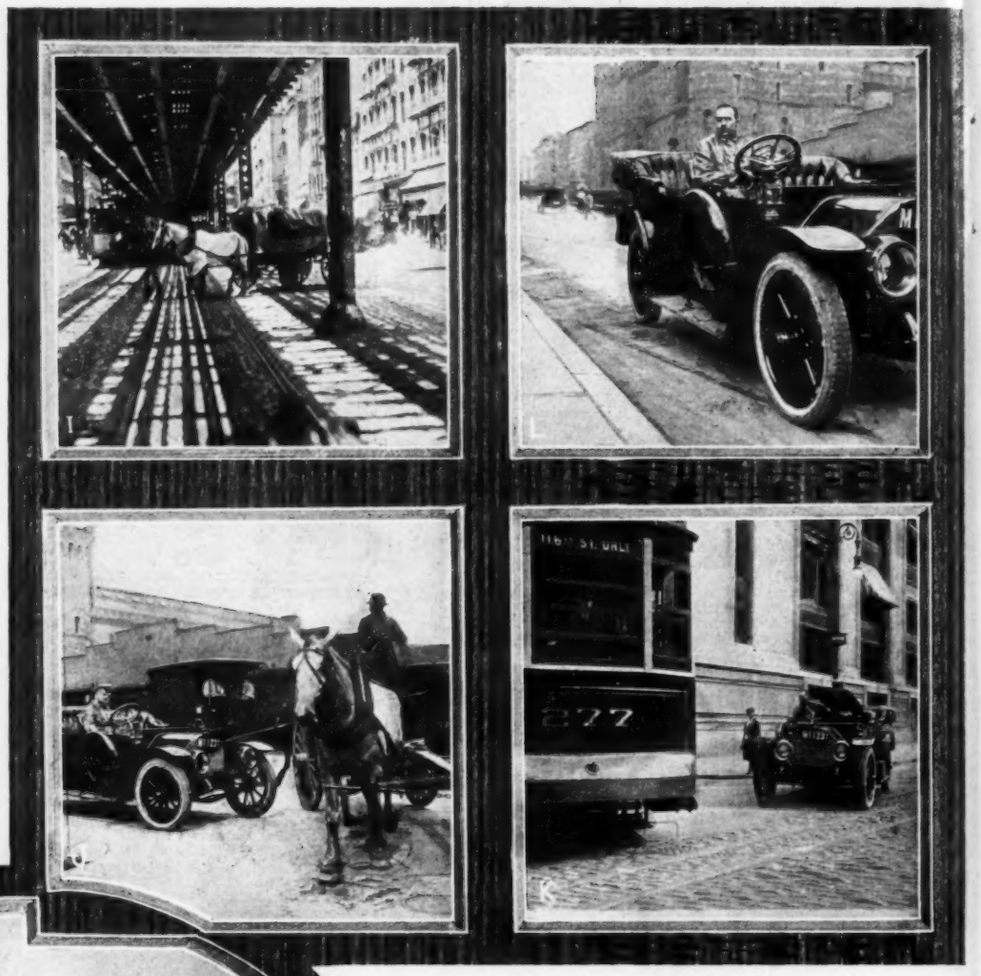
slower car cannot. He can make a set of violent Anarchists out of a peace-loving group of citizens in two hours, merely by altering his speed so that the trailers cannot escape the dust he throws up.

It is a legal duty also for the automobilist to use his warning signals to protect himself and others, but there is such a thing as overdoing it. It is quite possible to turn loose a wild shriek that startles all those within hearing, whether they are on the road and in range or not. There can be no question that the abuse of horns, whistles and exhaust signals, by intent or from carelessness, has made many an enemy for motordom.

Referring again to another phase of the "road hog" question, it may be said that the driver of a slow car can get into the classification without violating the law. Legally he can make a nuisance of himself to other users of the road if the road is sufficiently narrow and he happens to be in the lead. Many a time such "road hogs" have caused muffled profanity or worse by refusing to allow others to pass.

There are dozens of other instances that might be cited to show that the automobilist should observe the ethics of the road.

But in general, the operator of an automobile should not forget that he is or ought to be a gentleman. That his possession of a car indicates that he is possessed of some means and should possess at least as much respect for the rights of others as he expects to be shown to him.



I—Elevated railroad pillars form a veritable death trap for the unwary

J—Automobile drivers are not the only sinners on the road

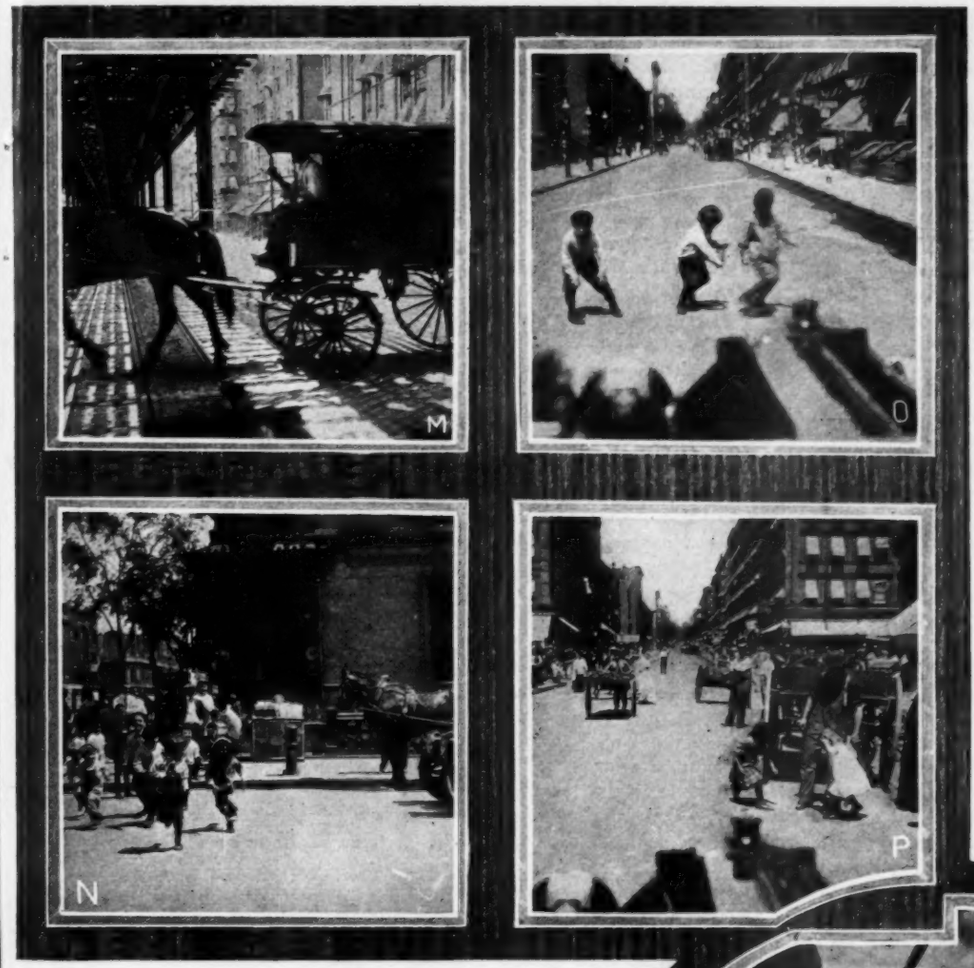
K—Passengers often prove a real danger—note the grasp of the hand on the driver's shoulder

L—Standing out from the curb is one of the cardinal sins against good traffic observance

H—If mishap should occur in turning thus, responsibility would rest with the driver

Illustrating Wrong and Right Ways to Drive and Enlightening the Motorist as to the Proper Method of Procedure in the Event of Unforeseen Happenings.

If he will study the law far enough to gain the idea that the operation of his car must be done reasonably and with a due appreciation of the rights of others, he will have progressed about as far as the average citizen can under the present mixed conditions. The crowning touch may be added to his immunity from legal consequences in New York City if he will recognize the fact that the traffic squad in the absence of a definite speed law that is effective, interpret the situation on a basis of "reasonableness." Furthermore the Supreme Court has upheld their interpretation.



M—A tight fit under the "Elevated" on a slippery day

N—One moment in every driver's life when his foot should be on the brake pedal

O—The streets—childhood's playground—may lead to the grave and the prison

P—In traversing congested thoroughfares such as this, constant vigilance should be the only rule

Everyone operating an automobile should adopt this motto: "Consideration for other users of the road." Kindness begets kindness, and the considerate driver will find his path strewn with flowers, whereas the self-opinionated egotist will find that his road will be a rough and tortuous one. It may seem strange that a smile will do so much to facilitate matters, but human nature among the classes of drivers that use the road is the same as in any other walk in life. The average automobile is the fastest thing on the road and is usually there for the pleasure of the occupants; consequently the driver of the horse-drawn wagon or truck who has his living to get by driving and delivering goods should be entitled to consideration on this count alone. Then there comes another vital point, and that is that the driver's control over a car is vastly superior to that over a vehicle drawn by horses, and to cause the latter to be pulled up suddenly is the act of a boor.

This does not mean that every time that the driver of a horse-drawn vehicle is desirous of passing or taking liberties with the rules of the road that he should be given a free hand to do as he pleases. It may happen that in order to accommodate someone who wishes to violate the regulations the autoist may put himself within the pale of the law. Quite apart from the damage done to the car through speeding, it is very trying to the occupants to be always on the *qui vive* until each successive "tight corner" has been safely negotiated. This sort of thing makes motoring a tiresome pleasure, and "risky" drivers are more responsible for the antagonism that prevails against cars than are noise, smell and all other possible objections combined. It is difficult to eliminate the road hog and joy rider and to make special regulations that will sound their death knell, but justices and magistrates will be doing the community at large a great service if, when they have such men before them on a proven charge, they exercise their full powers and teach the culprits a salutary and much-needed lesson.

In driving an automobile everyone knows that there are traffic situations that may be termed risks that one is forced into unwittingly, and it is to these only that allusion will be made here in endeavoring to show the proper method of conduct. The risks that drivers put themselves into un-

Q—One result of an abortive attempt to change traffic rules without notice

necessarily are too numerous to mention, and the difference between a good driver and the other kind is that the good driver is seldom if ever caught in a trap that he cannot readily extricate himself from.

It is a misconception that the man who can take a corner on two wheels is a finished driver; he should be sent back to learn how to keep all four wheels on the ground.

The blue-coated limb of the law is a *bête noir* to quite a few users of the road, but he is as people make him. If one stops to think what it means to a man who has to stand on point duty for several hours directing traffic to be greeted with a smile and a certain amount of civility, he can easily turn the peace guardian into a friend instead of an enemy. Without the assistance of these officers traffic would be a hopeless chaos, and it is the part of the prudent to facilitate their good work rather than aggravate its manifold annoyances. Regulations that have been made for the safety of everyone concerned, pedestrians and drivers alike, must be rigidly adhered to and enforced if broken, and in this respect every driver should acquaint himself with the rules of the road and, what is more, observe them.

When about to stop the car the driver's hand should be held out sufficiently far to allow other users of the road behind to see it, and in this the passengers might assist to give vehicles on the other side of the car proper warning. This is shown in Fig. B, where the driver is desirous of making a right-hand turn and pass in front of another vehicle. In Fig. E the passenger is adding to the driver's warning by placing his hand out; but although this is correct, the driver has no right to pass from the inside position that he is occupying and pass in front of the horse-drawn wagon and the automobile in the rear. In order to make the turn the car should be where the car coming in the right-hand side of the picture is situated. Should an accident happen through such a turn the owner would say that he held his hand out to give warning, but that would not exonerate him from blame.

There is no definite law as to the number of feet that one should be from the curb when turning a corner to the right, but the section simply says "as near the right-hand curb as practicable." This is shown in Fig. F, and it is well to either obtain an inside position to make the turn or be sure, as in Fig. B, that there is no fast-moving traffic on the inboard. When turning to the left the center of intersection of the two streets must always be on the left-hand side of the car, a violation of which procedure will be seen in Fig. H. The reason for this will be clear to everyone, as it is impossible for any traffic coming in the direction indicated by the arrow A to see the outcoming car, which should have taken the route indicated by the arrow B. Another reason is that the driver of a vehicle wishing to turn down the street from which the automobile is coming either from the left or right will have to cross the line that the car is making and an accident may result. Automobiles are not the only violators of the traffic rules, and it therefore behooves every driver to pay attention to other users of the highway, especially at turnings. In Fig. J the center of the road happens to be marked by a manhole, and the driver of the team seems to be much interested in the hairbreadth escape of the automobile and is paying no attention to where he is driving. The driver's hand will be seen in this picture on his brake lever, which had to be applied in order to avoid a collision. A man was asked if he ever felt nervous while driving, and he said that he was never nervous about himself but was scared by some of the other fools who drive. This is the case with many people and shows that it is not wise to disregard other drivers' eccentricities. Fig. E is an instance of the first rule of the road, and the example shows how not to do it.

A driver is often called upon to use his judgment very quickly as to which path to take and he should be always guided by the traffic regulations. One day last week a driver of an automobile thought he could pass to the right a trolley car going in the same direction as himself, but did not count on the speed of the street car or consider that there might be something coming in the opposite direction. A momentary hesitation on his part as to whether to go on and "chance it," or apply the brakes and stay behind the street car, resulted in the "sandwich" that took place, with the result depicted in Fig. Q. It is safe to say that an automobile should never pass a street car where there is a double track otherwise than on the left, and in overtaking a street car the driver should exercise great care so as not to interfere or flurry passengers getting on or off the car. One of the most deceptive things about city driving is the amount of clearance to give to trolley cars as they emerge from a side street in the manner shown in Fig. K, and with another street car coming in the opposite direction it is a very easy matter to get wedged between the two. The passenger in this picture will be seen placing his hand on the driver's arm, which is the worst thing to do in such an emergency, as it distracts his attention at a moment when he wants all his wits about him. Drivers are only human, and any owner of a car who makes a practice of telling the driver what to do under such circumstances should either give up the habit or get a driver that he can trust. It would not be too much to state that in such cases if an accident results the passenger is as much to blame as the driver. No one except a driver actually at the wheel can feel what the car will do under certain circumstances.

Hardly a day passes without some accident happening through a car being either wedged between the pillars of an elevated railway and trolley cars or skidding into them with disastrous results. The rule to follow with regard to streets where there are elevated pillars is to make a circuitous route and avoid them. But in the cases where it is necessary to drive under them never try to pass between a trolley car and the pillars and never exceed eight miles per hour.

At Fig. M is shown an everyday occurrence in New York where the brakes are necessary. The drivers of horse-drawn vehicles pay little attention to cross traffic, and it might be well for the average driver of cars to note that unless there is a member of the traffic squad to direct the movements vehicles passing up and down main avenues have the right of way over vehicles coming out of side streets.

This brings one to the matter of the signs and signals that are used by the traffic squad to let drivers know their pleasure. In cases of congested traffic the whistle is used and one blast denotes that the traffic moving north and south shall stop and allow east and west-bound traffic to proceed; two blasts of the whistle denote that right of way for the east and west traffic is stopped to allow north and south-bound traffic to proceed. Three whistles denote the approach of a fire engine or other vehicle, such as an ambulance, that has always the right of way, in which case the driver must pull his car into the curb as near as possible and come to a standstill till the cause of the alarm signal has passed. When a car is brought to a standstill near the curb for anything other than a traffic stop the wheels on the near side must not be more than six inches from the curb. A car left two feet away, as shown in Fig. L, may be the cause of an accident, and such proceeding may bring one to unpleasant notoriety on a charge of obstructing the traffic.

The traffic squad officer should be watched carefully for any directions that he gives to the traffic, as any violation of his instructions will mean trouble to the driver. Methods of stopping traffic are shown in Figs. A and C. Until the officer's arm is lowered and the whistle blown as shown by the movements that can be seen in Figs. D and G, the driver must remain at rest.

Pedestrians have not yet learned the speed that an automobile can travel, or, rather, the rapid acceleration powers that cars possess, and miscalculations on their part must be allowed for in driving. Everyone who has driven in towns and cities is aware of the way some people have of meandering over the road, entirely disregarding the fact that it is made for vehicular traffic, and one must not go along simply blowing the horn and expect people to get out of the way. The particular person that one wishes to warn may be deaf or afflicted with some impediment

that prevents him from making as quick an exit as desirable. Once a non-motorist is scared by an automobile he is apt to become an anti-motorist, due to the thoughtless want of consideration of a driver. People will step from the curb into the road without looking if there is any approaching traffic, and pass from the front of a trolley car or wagon just as one is about to pass. It is a safe rule to make that in passing a stationary vehicle extreme care should be taken and the speed decreased so that an abrupt stoppage will not be necessary to avert an accident. Accidents will happen, and no matter if it be the fault of the autoist or the other party there are several necessary things to do so that in case of a suit for damages the driver will be in possession of all the facts and be in a position to refute them if they are untrue. The name and address of the injured party should be taken and the names and addresses of as many witnesses of the accident as possible. The position of the automobile should be measured from the curb, also the position of the party or vehicle struck. The time of day and the exact location where the accident took place should be carefully noted so that it can be visited afterward and the whole drama gone over with the defending lawyer. Do not be afraid of giving name and address to the injured party, and as a golden rule, never run away. If possible obtain depositions from witnesses at the time of the occurrence and get them to sign them; if the other party is in the wrong, do not fail to write a letter the same day detailing the circumstances and laying the blame at his door. It is presumed that the car is insured for accidents, and an exact and detailed description of the occurrence should be mailed to the insurance company within twenty-four hours; in fact, the sooner the better. In case a police officer comes on the scene, under no circumstances make any remarks of regret, and also prevent the occupants of your car, if there are any, from joining in the discussion. They are eye-witnesses, and an inadvertent word let drop by one of them may be the turning point in the case if it ever comes to trial. Do not revile the other party, but keep cool and collected. It is a very unwise plan to offer monetary recompense then and there. Suppose the other party refuses it; no amount of explanation afterward will do away with the bad impression that such a proceeding leaves behind.

Children of tender years, and even others who ought to know better, are often the cause of much annoyance to the automobilist. They cannot understand the why and wherefore of things, and as the street is their playground it will take several years to educate them. Street scenes such as those depicted in Figs. N, O and P are everyday occurrences. The tiny mites love to get as near to danger as they possibly can, but their heroism is sometimes rewarded in a manner they little expect.

The smoke nuisance has at last been taken in hand seriously by the New York police, and as a car belching forth blue smoke is an abomination the move is a good one. Elsewhere in this issue the lubrication systems of different makes of cars are dealt with in some detail; it behooves the autoist to furbish up his knowledge of this part of the car's mechanism, and if found faulty it will be cheaper to have it put in proper working order than to pay fines and be put to the annoyance of appearing in a police court, with the ensuing waste of time.

The open exhaust nuisance is becoming a question that should also be dealt with by the authorities with a firm hand. It is the sign of an ignorant or inconsiderate driver to go through cities and villages with a gatling gun roar, and to have one's peace of mind shattered by these harebrained idiots is more than the most phlegmatic can stand. Is all the care and striving of makers of cars in the pursuit of silence to be upset by such men as these? The open exhaust is a good means of testing whether the cylinders are firing regularly, and it is thought by some to benefit a car's performance on a hill; if restricted to these uses it may be a good thing, but in starting from a standstill in residential sections, especially at night, the use of the open exhaust should be discountenanced by every law-abiding motorist.

A Guy Vaughan car was used in taking the photographs illustrating this article.

Where to Spend Independence Day

Hills and Ocean vs. Heat and Fire-Crackers

Automobile owners have the privilege of avoiding the heat and noise of the Independence Day celebration this year without taking valuable time from business. The regular week-end beginning Saturday noon will be stretched over Monday this year, and as Tuesday is July 4, there seems to be less reason for remaining in town than in other years. To the owners of automobiles, The Automobile suggests that a pleasant and profitable way to spend the holidays is to follow either of the tours outlined below, or any others that individual taste may indicate.

THERE are twenty-seven valid reasons why nobody should stay in town on Independence Day, July 4. Each of these reasons applies more forcibly to the man who owns a car than to any other citizen. In the first place, the Glorious Fourth comes on Tuesday this year, thus stretching the usual week-end from a mere Saturday-to-Monday holiday to a real miniature vacation of four long days. There will be little business done in the metropolis on Monday, so why not enjoy the opportunity to get away and stay away until Wednesday morning?

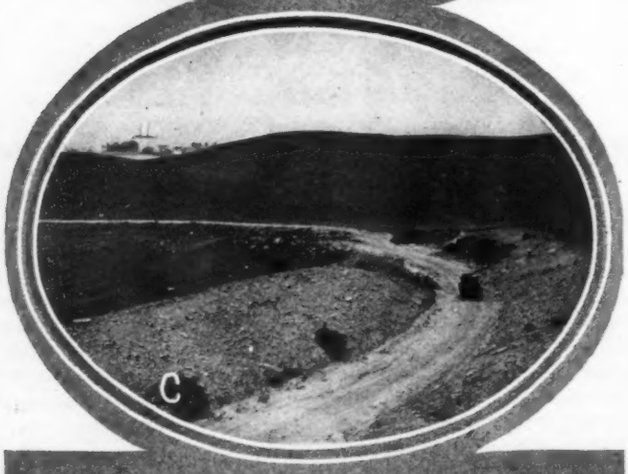
That is the first reason for the automobile owner to consider. Second, everybody does not possess the keen appreciation of the beauties of cannon crackers that is held by the average youthful American, and most adult members of the community would gladly go through the whole day without hearing so much as the snap of a squib, than otherwise. Reason three is that it is usually hot in town and cool on the road. The other twenty-four reasons, good as they all are, do not matter.

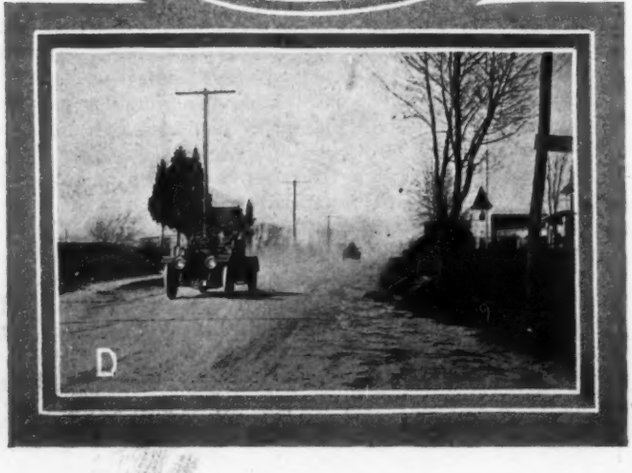
Therefore it is suggested that July Fourth and the week-end preceding it and the Monday intervening, might well be used in a little trip to the heart of nature via the automobile.

There are dozens on dozens of interesting runs that may be taken, ranging from a swift journey out and back covering two days, with night stops in the cool hills or on the seashore, or it may run into three or four days, at a leisurely gait, taking plenty of time to enjoy the beauties of sylvan life and the grandeur of nature in her many moods.

Out of the hundreds of trips that might be taken as outlined in all the volumes of the Automobile Blue Book, the quartette mentioned in the following brief suggestion seem nicely fitted for automobile touring from New York City, although there are many others that afford equal advantages.

The illustrations show just a few of the typical scenes along the routes chosen. The four selected are respectively to the





Berkshire Hills, Catskills, Montauk Point and Atlantic City. The first and second offer a variety of scenery and the promise of cool nights among the highlands. The third takes the tourist over the fine roads of Long Island to the mysterious land out on the east end of the route. To those who have never explored this section, the selection of this route will prove interesting and with good weather enjoyable. The last of the quartette is the run that is probably the most familiar of any, the tour to Atlantic City.

Taking them in order, the trip to the Berkshires comes first.

If the party makes a start in the early afternoon on Saturday, leaving Columbus Circle say at 1 o'clock, it will afford a nice easy run in daylight to reach Poughkeepsie for dinner, following Route 14 of Volume 1 of the Blue Book.

This route takes one clear to Van Cortlandt Park via Broadway and Yonkers is passed about 2 o'clock. About 5 miles beyond Yonkers the road passes the place where Washington established his headquarters in 1781. A little farther along Irvington is passed, the place where Washington Irving lived, labored and is buried, and in passing one may see Sunnyside, the home of the noted writer, and farther along when Tarrytown is reached, Christ Church, where Irving served as warden, and Sleepy Hollow, which he immortalized in his works, are show points. Here also is the monument erected to commemorate the capture of the gallant and unfortunate Major Andre and several points of much interest to all Americans, especially on a holiday having its climax in the anniversary of America's independence.

About 6 miles from Tarrytown is Ossining, one of the gems of the Hudson from a scenic point of view and the location of the State's prison. Touching Croton-on-Hudson, the tourists reach Peekskill shortly after 3 o'clock, having made a little over 40 miles from the start. The rest of the run to Poughkeepsie takes the party through Cold Spring, Fishkill Landing and Wappinger's Falls, reaching the night stop about 5.30 o'clock, making 74.8 miles during the run. There are a number of comfortable hotels in the city and of course ample garage accommodations.

Sunday morning the party may suit its convenience about an early start because the road as outlined in Route 43 to Pittsfield, Mass., is only 78 miles long. Leaving the Hudson river, the way trends north-eastward through Pleasant Valley, Washington Hollow, Millbrook, Amenia, Millerton, Lakeville, Conn., and Salisbury to South Egremont, where the rolling Berkshire Hills are entered. From there, through Great Barrington, Stockbridge, Lenox, the way leads to Pittsfield, traversing a country that has been pronounced to be among the most beautiful in the world for variety of color and perfection of restful scenery.

The return trip over Route 12R is considerably different from the way taken outward bound. It is direct to New York and a little farther east than the other. It touches West Stockbridge, Great Barrington, South Egremont, Salisbury, Lakeville, Sharon, Dover Plains, South Dover, Hurd's Corners, Pawling, Carmel to Columbus Circle, in all 150.3 miles. The northern half of the route is over excellent macadam, followed by 20 miles of good dirt road and then finishing over the New York State macadam road.

The run to the Catskills suggested is as follows: Starting on Route 16 to Newburgh, N. Y., 58.2 miles, crossing the river at the Harlem ferry and touching Fort Lee, Hackensack, Hohokus, Suffern and through the Ramapo Hills, Tuxedo, Southfield, Vails Gate, into Newburgh. Then taking Route 171 extending to Kingston, 36.2 miles covering Plattekill, Modena, New Paltz, Eddyville and Wilbur. North from Kingston Route 201 along the Hudson and skirting the eastern base of the Catskills

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A—One stage of trip to Berkshires, showing winding road near Peekskill
B—Where the Berkshire Hills begin to make their presence felt
C—Mysterious-looking Montauk Point, with road, bare hills and sea
D—The smooth boulevard that connects Ocean City with Atlantic City

takes the tourist to a variety of comfortable resorts back in the hills.

Returning, the party may follow the reverse of Route 201, known as Route 86, as far as Kingston and then gain some diversity of scenery by swinging into Route 215, which is somewhat to the east of the Route 171. There are numerous beautiful views to be enjoyed in the 34.9 miles to Newburgh which will probably repay the tourist for the rather poor condition of the roads.

From Newburgh to New York Route 182 affords a delightful way home. This is via Goshen, Greenwood Lake and Paterson, winding through the hills over roads that are usually above the average.

The tour of Long Island may be easy and luxurious or stiff and strenuous, as the automobilist desires. If he wishes to make an interesting trip he may take Route 103 outward bound. This is all easy sailing as far as Greenport, 115.1 miles from the start, which would be from Long Island City, following the fine roads to the south shore and continuing to Greenport. Then comes the strenuosity. If the tourists want a taste of the unusual let them continue east from Bridgehampton, passing the road that turns north to Greenport and following east to Montauk Point. The roads are sandy but not impassable and the tourists will probably feel well repaid for the extra run. If this is done the mileage will be 133. Then the party may return over the same road to the regular turn described in Route 103 and reach Sag Harbor or Greenport for the night.

Returning, the party may take Route 104, which skirts the north shore, reaching New York via the Queensboro Bridge, 103.4 miles. There are so many delightful little side runs possible on Long Island that this trip might well occupy the whole holiday or it can be made in two days with ease and comfort.

The last tour of the four suggested for Fourth of July is the one to Atlantic City via Lakewood. The trip to Lakewood is over magnificent roads covered and described in Route 53 of Volume 3. It is via Newark, Elizabeth and the Amboys, 63.8 miles. The rest of the distance to the objective point is via Route 218, passing Toms River and skirting the ocean through Barnegat and Absecon to Atlantic City.

Returning, a more roundabout course may be pursued by following Route 237 to Trenton, 90.8 miles via Magnolia and the fine roads of that section. Then taking Route 186 to Morristown, 50.6 miles over improved highways through some of the historic ground of the Republic, notably the battlegrounds of Trenton and Princeton. From Morristown to New York, Route 127 affords an easy and direct way over more excellent roads, 28.5 miles.

With good weather it is certain that there will be more touring this coming holiday season than ever before, not only for the reasons stated in the beginning of this article, but because touring is one of the main uses of the automobile and everything has conspired to advance the cause of the tour at this particular time.

Moderate cost will not deter the man who wants to enjoy his car, and either of the tours suggested may be taken in physical comfort without the element of excessive cost. There are abundant supplies to be had all along any of the routes and the accommodations are equal to any in the country.

The advantages to be derived from such trips are too numerous to mention in detail, but every automobile owner knows what they are and if the sun shines, not too warmly, the chances are that the roads will be constantly lined with tourists bent upon escaping the heat of the city, the noise of the cannon cracker and potash torpedo and the danger attending the irresponsible use of firearms.

E—Great Barrington, en route to the rolling hills to the northward
F—One of the fertile valleys along the way to the Catskills
G—Where the pines soothe and beautify the way at Lakewood
H—Noble stretch of country near Turner with a similar highway

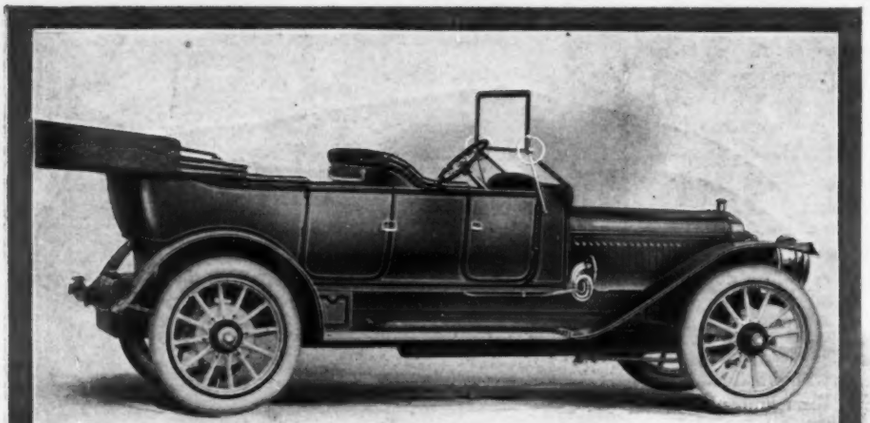


Fig. 1—Right-hand side of the Winton "Six" touring car of the foredoor type

Revision of

Minor Changes All

Illustrating the Winton "Six" as it is offered work, showing that there has been no past, and that minor changes dictated approved practice would seem to idea of building six-cylinder motors stroke of 5 inches, thus making the the motor at 48.6 horsepower. The feature for some years, is continued. desire for more room, is the lengthening to all models.

ONE CHASSIS with a 48.6 horsepower, six-cylinder motor, along conventional lines, conforming to the Winton custom, characterizes the output of the Winton Motor Vehicle Company, of Cleveland, Ohio, for the approaching season. In body work the foredoor type obtains, and Figs. 1 and 2 showing the right- and left-hand side of the seven-passenger touring car will suffice to tell the reader of the art side of the situation, and how the comfort of Winton tourists is being taken care of, and it will be understood, of course, that the body options include a limousine and other efforts, in addition to the touring car. An examination of the body illustrations here given will enable the reader to observe how the windshield is struck back from the overhanging cowl, bringing the vertical portion thereof in a plane comfortably in front of the steering post, protecting the occupants of the front seat in a most thoroughgoing manner. The side entrances are wide and unobstructed, and the exterior of the body is smooth and well appearing.

The power plant as it is nested between the side bars of the chassis shows the left-hand side in Fig. 3, and the right-hand side of the same is presented in Fig. 4. Referring to Fig. 3 it will be seen how the Stromberg carbureter C1 is flanged F1 to the upward sweep S1 of the manifold, dividing the mixture into branches B1 and B2 to secondary branches B3, B4, B5, and B6, from which it would appear that a decided attempt has been made to deliver to each of the six cylinders its precise measure of mixture, thus producing increments of the torquing impulses on an overlapping basis. This side of the motor also carries the self-starting equipment with its neatly arranged piping, terminating in fittings on the cylinder faces, with priming cocks C1, C2, C3, C4, C5 and C6 screwed into the tops of the fittings, and attention is called to the workmanlike manner attending the placing of this equipment, and the excellence of design of the water pipe W1.

Referring to Fig. 4, it will be seen how the magneto M1 is placed in the mid position back of the water pump W1, and the method of wiring from the magneto to the cylinders of the motor suggests the idea that a decided attempt has been made to prevent leakage of the high potential current, and to enable the operator of the car to see at a glance whether or not the wiring is in good working order. This side of the motor shows the distributing legs of the intake manifold, they being indicated on Fig. 3 as B3, B4, B5, and B6, and it will be seen in Fig. 4 how yokes are placed to hold the exhaust manifold E1 in conjunction with the intake manifold in place on the cylinder.

The high potential leads from the magneto are guided through insulated eyes at one extremity of the insulators I1, I2, I3, I4, I5, and I6, which insulators are fastened to the yokes, the positions being at quite a distance from the cylinders, so that the rubber insulation of the high tension wires is afforded an unusual measure of protection.

Fig. 5 shows the nesting of the power plant and chassis and the motor M1 back of the radiator R1 and the transmission gear T1 placed amidship somewhat closer to the flywheel F1 than common practice would seem to indicate, this being possible on account of the placing of the multiple disc clutch within the transmission gear housing. Power is delivered from the transmission gear to the universal joint U1, connecting with the propeller shaft P1 leading back to the live rear axle. The sliding gears are manipulated by the side lever L1, with the selector mechan-

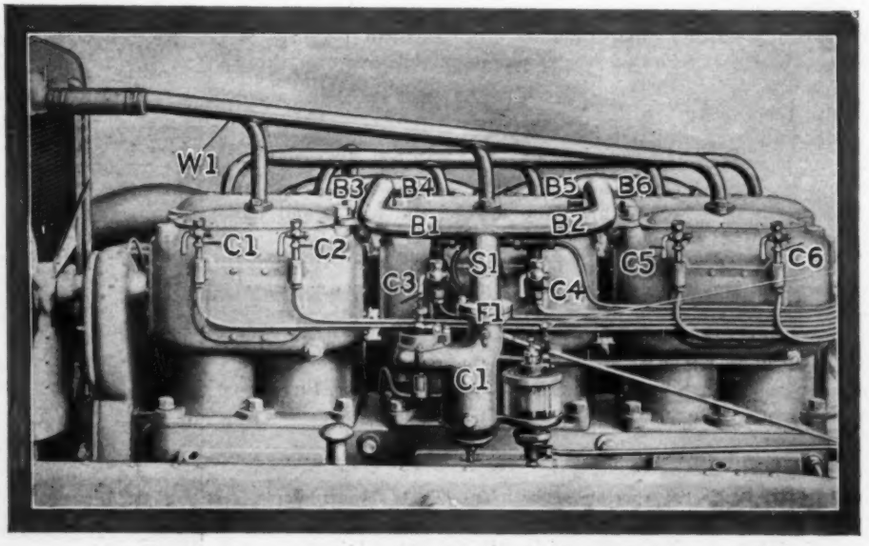


Fig. 3—Left-hand side of the six-cylinder motor as it is mounted in the chassis

Winton "Six"

That Was Required

to its clientele for the immediate future radical departure from the practices of the by the experience of a year were all that demand. The company continues the only, with a bore of 4½ inches and a displacement 477.2 cubic inches, and rating self-starter, which has been a Winton One of the 1912 refinements, dictated by a of the wheelbase 6 inches, which applies

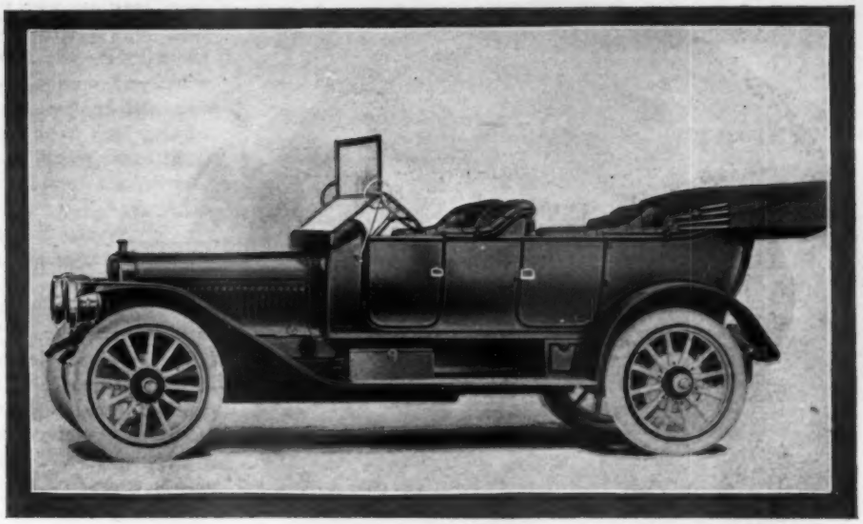


Fig. 2—Left-hand side of the Winton "Six" touring car of the foredoor type

ism placed in the housing H1. The pedals P2 for the clutch, and P3 for the emergency brake, are placed on the right-hand side of the chassis, swiveling on a shaft S1, which is provided with one bearing B1 amidships, and a second bearing B2, which is held by a bracket anchored to the right-hand side member of the chassis.

Referring to Fig. 6 of the transmission gear, it will be seen how the multiple disc clutch C1 is housed in an extension of the case, and the nesting of the gears is also shown with a prime shaft S1 in line with the clutch and the lay shaft S2 to the left thereof, in the horizontal plane with the racks for sliding the gears placed to the right in a shallow extension E1. Annular type ball bearings B1, B2 and B3, take care of the transmission through the clutch, and direct drive D1, and annular type ball bearings B4 and B5 support the lay shaft. The transmission gear includes four speeds and reverse, involving the selective idea, and particular attention is called to the fact that the direct drive is on third speed, fixing the ratio of the drive at 3.2 to 1 so that the fourth speed is indirect with a ratio of 2 1-2 to 1. Referring to the multiple disc clutch, a particular effort has been made to secure a quick release of the discs, and ridges are provided in each disc to impart a spring-like effort, separating adjacent discs. When the clutch is engaged these spring-like ridges compress, thus permitting the members to adhere to each other with tenacity so that the performance, broadly speaking, involves a soft engagement, positiveness of the drive, and a quick release. The universal joint which is placed at the back of the transmission gear is shown in Fig. 7 in sufficient detail to impress the reader with the fact that it is a most substantial piece of work, and attention is directed to the adjustable bearings B1 and B2 to the trunnions T1 and T2 for the taking up of lost motion, and this is in the face of the fact that the projected area of the bearings is on a most liberal basis. The yoke Y1 integral with the shaft S1 is of stout design, and among the details of importance the wire block W1, by means of which the holding studs are kept tight, is mentioned for its simplicity and effectiveness.

How Some of the Remaining Important Details Were Improved and Brought Up-to-date.

Glancing at Fig. 8 of the pedal assembly, the clutch pedal P1 is shown inside of the brake pedal P2, and the pedal shaft S1 is indicated with bearings B1 and B2 with grease cups G1, G2, and G3 so located as to afford adequacy of lubrication to the rotative surfaces. The clutch pedals have adjustments J1 and J2 accommodating the distances to the stature of the driver. Fig. 9 presents the assembly of the magneto M1 and the water pump W1 driven by a common shaft S1 from a gear in the halftime train through a coupling C1 with a second coupling C2 placed between the water pump and the magneto. The water pump is fastened to the crankcase by a flange, and a drain-cock C11 is placed at the low point, which is a convenient device to have when the weather is cold, and it is desired to remove the cooling solution, since it permits of the perfect draining out of the system. Grease cups G1 and G2 are placed at points of vantage on the water pump, and referring to the magneto M1 again it rests upon a ledge of the crankcase and is held in place by a strap S1 with a clamping means at the top and a wing nut W2 employed in the clamping, making it possible to quickly unscrew the same if the occasion requires, so that the magneto may be removed and inspected

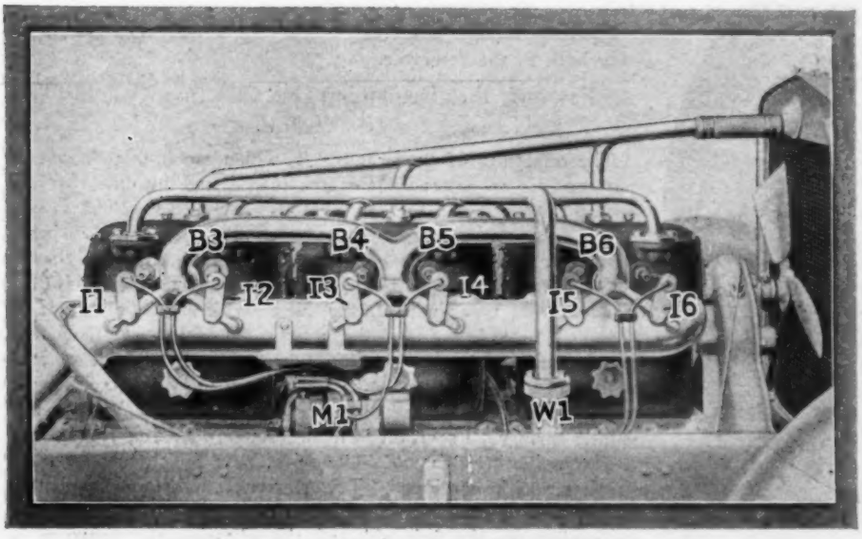


Fig. 4—Right-hand side of the six-cylinder motor as it is mounted in the chassis

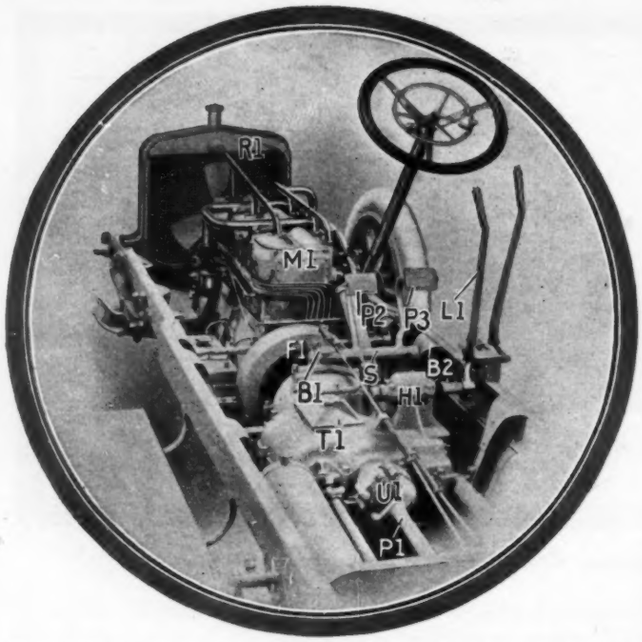


Fig. 5—Showing the nesting of the power plant in the chassis and the relations of the units as they there obtain

or repaired and put back again with little effort on the part of the owner of the car. The magneto is of the dual system, and the purchaser may have his choice of Bosch or Eisemann types. The water pump is of the centrifugal type and cooling is done involving the use of a cellular type of radiator. In the working of the carbureter, of the Stromberg type, a small auxiliary gasoline tank is located on the dash, and the pint of gasoline that is held therein is controlled by a float.

Referring to Fig. 10 it will be seen how the offset crankshaft C1 is held by main bearings M1, M2, M3, and M4, splitting the crankcase in the vertical plane so that the left-hand part may be taken away, exposing the working parts and the main bearings with separable caps, thus making it possible to adjust for lost motion, or to do other work if the occasion requires. At the front end of the motor the halftime pinion P1 is brought into

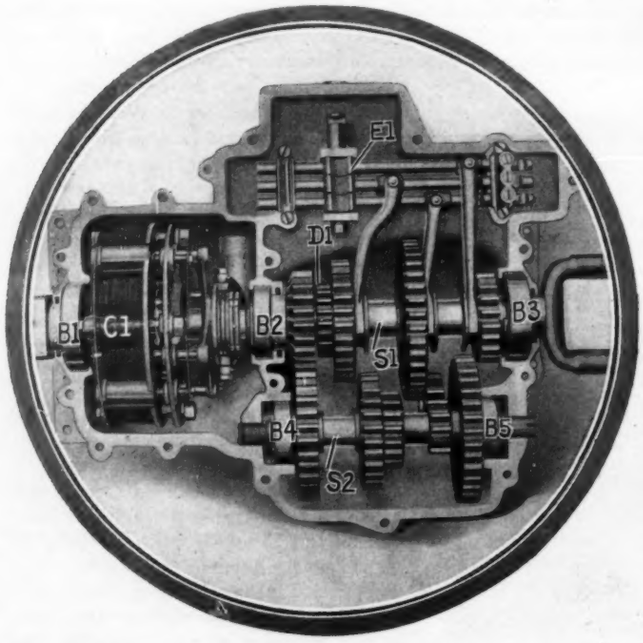


Fig. 6—Looking into the transmission gear, showing the multiple disc clutch in a separate compartment of the case

view, meshing with the halftime train, which is shown in some detail in Fig. 11. Referring back to Fig. 10, the lubricating oil pump P1 is shown on the underside of the crankcase at the flywheel end, motion to which is imparted by an eccentric E1, and the lubricating oil is circulated to the bearings at every point, coming back to the crankcase, where it is strained before it returns to the pump, and auxiliary lubrication takes place by means of a regulated quantity of lubricating oil in the dips of the crankcase. The oil pump system differs materially from common practice in that there are two plunger pumps in the set, one of which draws oil from the reservoir at the left rear of the motor, delivering it to the four crank bearings, and the other member of the pump draws the oil as it returns from the motor into the reservoir. The circulation of lubricating oil is through holes drilled in the crankcase, but there is a direct feed from the main bearings to the big ends of the connecting rods. The cylinder walls are lubricated partly by overflow and for the rest by splash. In the formation of the lower half of the crankcase a space is afforded for a small pool of lubricating oil into which each large end of the connecting rods dips, and the overflow of

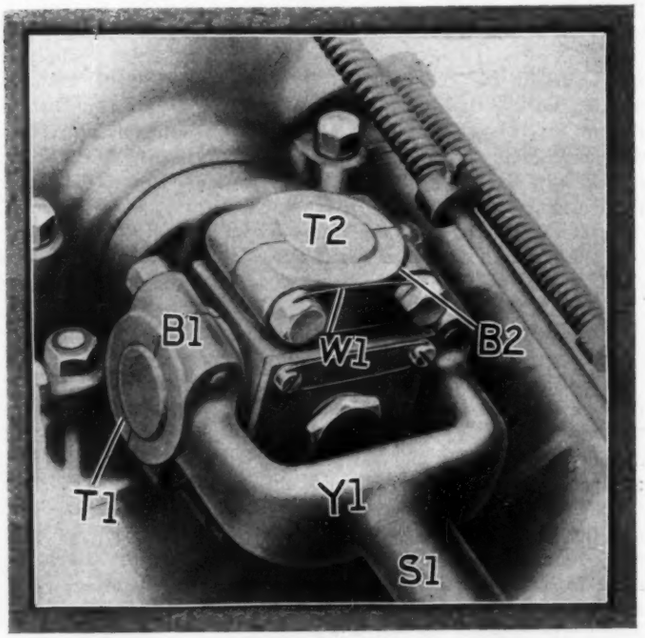


Fig. 7—Presenting the universal joint at the end of the propeller shaft

oil passes through strainers S1, S2, S3, S4, S5, and S6 on its way back to the reservoir.

A Few of the Remaining Details Involved in This Last Effort

The offsetting of the crankshaft, which amounts to about 15 per cent., is a continuation of the idea along this line that obtained last year, and the fact that this offset is retained is evidence from the Winton point of view that offsetting is beneficial. Referring to the rear axle, it is enough to say that it remains substantially as before. The brakes are of the internal and external types with fabric faces, with drums on the rear wheel. The side bars of the chassis have been lengthened to accommodate a longer wheelbase, and attention has been paid to the rigidity of these bars, but for easy riding qualities dependence has been placed upon the use of vanadium steel semi-elliptic springs. Provision is made on the gear box for a Gray & Davis lighting dynamo. The self-starter which met fame on Winton cars is continued. This starter, it will be remembered, is of the compressed air type and the storage tank for the air is located on the left side of the chassis; the pressure is maintained by an air pump mounted upon the motor. Air is led

from the tank to an air distributer, and six delivery pipes lead therefrom to the six cylinders of the motor. It is the function of the distributer to deliver air under pressure into the cylinder which is in the firing position, and the pressure so delivered forces this cylinder down, but if the first cylinder fails to fire, the air distributer sends the air to the next cylinder in firing order, and so on until the motor starts.

The new product includes a 6-inch addition to the wheelbase bringing the same up to 130 inches, which is common to all models. The extra six inches added affords a little more foot room for the front seats, and additional space in the tonneau. The foredoor idea is standard practice in the new work, whereas last year it was a special feature. In the lighting of the new cars the electric dash lamps which are carried inside of the body beneath the overhanging cowl offer unusual advantages. Both headlights and the tail lamp are of the combination design involving oil and electric illuminating methods, and in the upholstery of the automobile deep cushions are the vogue.

The use of demountable rims on both front and rear wheels is one of the novelties of the 1912 equipment, the Booth rim being fitted throughout. The tire size adopted for the present model is 36 x 4 1-2 fore-and-aft, this being a slight change from last year, when tires of 4-inch section were used on the front wheels.

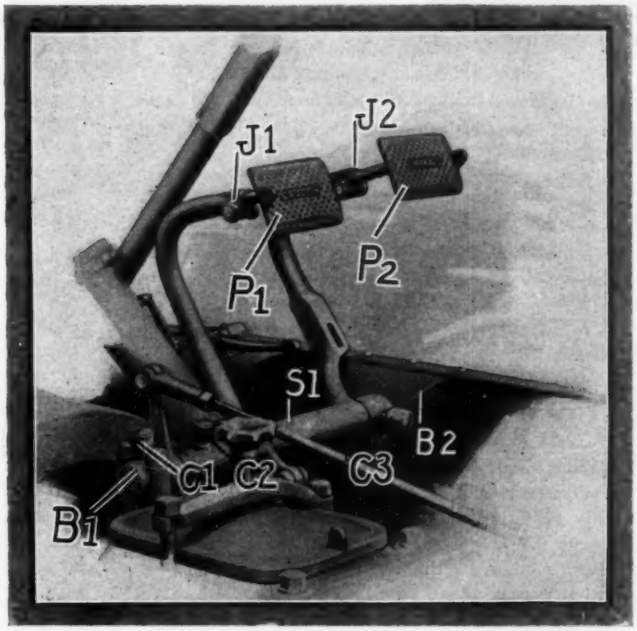


Fig. 8—Clutch assembly showing adjustable pedal, means for lubrication and a substantial design

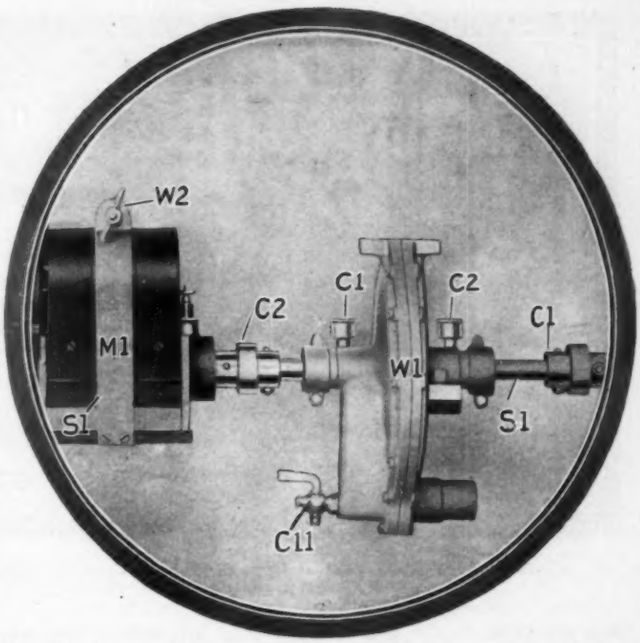


Fig. 9—Magneto and pump assembly, showing a common shaft drive between the units

Many Imitations of Mohair

John C. Haartz, graduate of the Lowell Textile School, of Lowell, Mass., presents his views descriptive of mohair and makes pertinent observations bearing upon the subject of its use for tops taking this occasion to deprecate the use of cheap imitations of mohair on automobiles of some pretense.

FOR the past six years a great many so-called mohairs have been used by the automobile trade for making tops and slip covers. While a certain percentage of this material has been made from real mohair, on a cotton warp, fully 75 per cent. has been made of luster wool, all cotton or various other cheap substitutes. The result has been that users of tops have experienced a great deal of dissatisfaction. Some of this trouble has, of course, been due to an inferior grade of rubber interlining and some due to lack of proper care of tops by users.

The object of this article is to give the public a better idea of what real mohair is and why it is a fabric without equal for automobile tops. Genuine mohair is the hair of the angora goat. It is a hard smooth fibre the separate hairs being constructed just like a wire, as shown in Fig. 1. It is impossible for dust and dirt to work into it and lodge there permanently, because there is nothing to hold the dirt.

To give the maximum amount of service the fabric should be woven of sufficient weight and constructed closely enough so as to prevent the rubberizing being forced through the face. Quite a lot of real mohair is spoiled by being too lightly constructed and having its dust resisting qualities destroyed by the compound striking through in coating. A real mohair to give the best result as a top cloth should at least weigh 7 1-2 ounces or more to the yard. As near as the writer can ascertain less

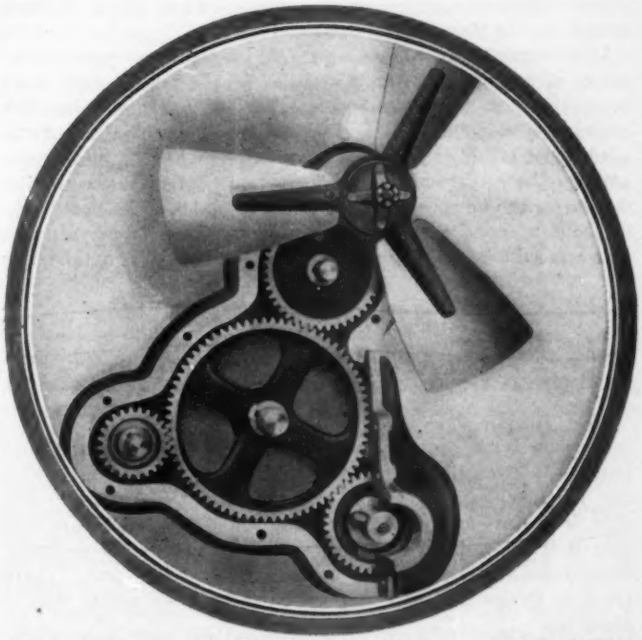


Fig. 11—Front end of the Winton motor with the cover off the halftime case, showing the meshing of the gears

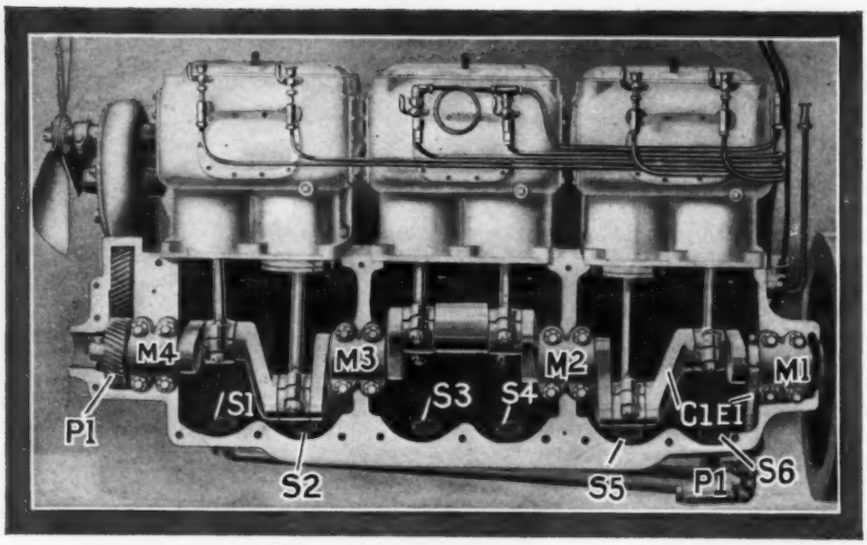


Fig. 10—Part section of the Winton motor, showing the crankcase split in the vertical plane and means for getting at the working parts

than one-third of the real mohairs thus far sold in top materials weigh over four ounces to the yard.

Another prominent factor is the dyeing of the fabric to get a fast color that will stand up in the best possible manner; the warp on which the goods are made should be dyed a fast color and afterward when the goods are woven they should be cross dyed. This costs several cents a yard more than the ordinary method employed but it is more than worth the difference, as it is the only way to obtain a dependable color.

Many people believe mohairs get dirty quickly and cannot be cleaned. A real mohair of the proper construction when properly rubberized can be easily cleansed and put in practically its original condition by a brisk brushing with a stiff broom. If brushed regularly once every week or two, a genuine mohair top will wear as long or longer than a top made of any other known top material.

One of the chief advantages of mohair as a top material is that the rubber or waterproof surface being protected on both sides cannot chafe or wear as it will in a cloth where the waterproof surface is exposed on the outside and it will give much longer service than the surfaced cloths.

Unfortunately, as stated above, only about 25 per cent. of the goods used thus far as mohairs have been genuine, luster wool being the most common substitute. It looks a great deal like mohair when in the piece and probably not one man in a thousand could tell it from the genuine article. But on closely examining the construction of the separate fiber of luster wool it will be seen to be covered with scaly projections and consequently is about as good a dust collector as could be found. In the figure it will be seen how luster wool looks. When this fiber

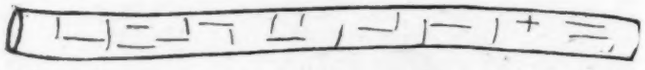


Fig. 1—Mohair fiber, showing smooth edge and very slightly scratched surface

becomes wet the projections or scales on the sides of the fiber bend away from the main shaft, and as it dries out these scales mat together, hugging to the main shaft and thus bind in and hold firmly any dust or dirt that may be on the cloth. Dirt thus held it is impossible to remove and this accounts for so many disreputable looking tops seen on cars at the present time. There are few things that will make a good car look worse than a cheap top.

The buyers of automobile tops have themselves, to a certain extent, been the cause of this substituting of unsuitable and practically useless material for real mohairs.

The original cloths brought out for the purpose were real mohairs and cost a certain price. The public demanded something that looked like mohair but cost less and they got it in luster wool.

It is hard to understand how anyone could pay several thousand dollars for a good automobile and then put on the cheapest top obtainable instead of paying a fair price for a genuine mohair top that would be on a par in quality with the car and give equal satisfaction.

Several automobile manufacturers are this season taking up the matter of mohair in the right way by having disinterested textile authorities analyze the materials submitted to them and are thus ascertaining the comparative values. They would not think of guessing at the comparative values when buying steel and have decided that the only reasonable way was to apply the same methods when buying top materials.

Either the Lowell Textile School, Lowell, Mass., or The Philadelphia Textile School, Philadelphia, Pa., are in a position to make such analyses in a thorough impartial manner.

Strainer Should Be in Gasoline System

To insure clean gasoline reaching the carbureter it is good practice to insert a strainer in the gasoline system between the float bowl and the nozzle. Accumulations will thus be prevented from reaching the latter and clogging it up.

CONSIDERING the diameter of the nozzle orifice of a carbureter, it is easy to understand how a little slime, or hard paraffine, will serve as the nucleus for further accumulations of such matter as will be found in gasoline. Therefore it is highly desirable that a strainer should be placed in the system, between the float bowl and the nozzle. This device requires the liquid to enter to the inside of the strainer, the object being to assure that the accumulations will be withdrawn, with the strainer, when the same is removed for the purpose of cleaning. There should be plenty of room in the well for the strainer, and a good space allowed between it and the walls of the housing. In some of the earlier types, it was the custom to afford but little room between the walls and the surface of the strainer, with the result that jelly formed readily, and when the strainer was removed for the purpose of cleaning the jelly failed to come out, but after being loosened up it would float up to the nozzle and cause stoppage of the fuel at frequent intervals until it became an argument in favor of a design such as would not allow the jelly to collect on the inner wall of the well.

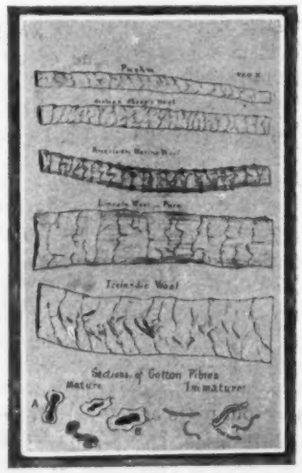


Fig. 2—Magnified varieties of several kinds of fabrics used in automobile tops

In the ordinary course it is not impossible to consider that a certain amount of dirt from outside sources will get into the tank—it is worth while to protect the gasoline supply from all such likely proceedings.

Keeping the Car in Working Order

The Proper Measure of the Maker's Responsibility

Clamping bolt of spring that was not tight and came off

Discussing the problems of maintenance for the purpose of showing that interchangeability of parts and the facilities whereby repair parts may be had are considerations that the purchaser of an automobile can ill afford to overlook, and it is the contention here that the maker's responsibility ceases ten years after the automobile is delivered to the purchaser, instead of when the bill is paid, which is the view taken quite frequently at the preesnt time.

WHAT constitutes a good automobile is debatable ground, and the force of contention depends upon the point of view. There are quite a number of makers of automobiles who labor under the false impression that their duties are adequately performed when they build and deliver cars that will run well, and continue to do so until service deranges the functional members, and the cars are placed at the tender mercies of the repairman. These makers fail to take into account the fact that service will no longer be obtainable, or at the price of an enormous repair bill, if the owner of the car is unable to send to the maker thereof and get repair parts at a reasonable price that will go into place when they are delivered and serve for the intended purpose satisfactorily.

Were makers of cars to admit that their products would cease to serve advantageously after two or three years' work, few, indeed, are the users of these products who would incur the cost thereof, since the service bill would then include, say, one-third of the first cost of the automobile, in addition to the regular maintenance charges, but if it can be said of a car that it will last for ten years, under suitable conditions of maintenance, no purchaser will be justified in taking exception to the cost thereof, even though it will be for him to get repair parts from the maker, and to pay for the cost of the substitution of these parts for the worn-out members which they are obtained to replace.

In counting the value of an automobile, based upon its first cost, it is the purchaser's duty to estimate not only the initial price of the car, but the cost of maintenance also, and in figuring upon the latter item, it is for him to ascertain whether or not repair parts are carried in stock by the maker, and he will not be going too far out of his way if he gets an idea of the price at which these repair parts may be had from time to time as the exigencies of service would seem to indicate. But if repair parts cannot be obtained, even though the automobile may be of beautiful design, and constructed of marvelous material, it will be a poor purchase, for, as service has shown, no man has ever succeeded in building a car that will not depreciate more or less readily, if it is put to work, and the only way that this depreciation can be offset is through the process of replacing the worn-out parts and attending to the upkeep of the car.

But it is a useless task to try to replace worn-out parts by substituting repair members, if the automobile is not built on an interchangeable basis, and if the limits of tolerance as they obtain in the plant in which the car is made are too liberal to satisfy the end, or if this important matter is entirely disregarded, and rule-of-thumb reigns. It might be said that no builder of automobiles is so lacking in intelligence that he would put his money into the construction of automobiles on such a basis that hand-fitting would have to be done at every point, and the making of repairs would be rendered impossible, but it must not be overlooked that the maker of automobiles does not put his money into the cars at all—it is the user thereof who furnishes the purchase price. True, in the ramifications of making automobiles, money has to be advanced to pay for materials, the labor items overhead, but the banker who does the "accommodating" fully understands that his money would be lost were it not for the fact that purchasers are to come to the rescue at the proper time and satisfy the deficit.

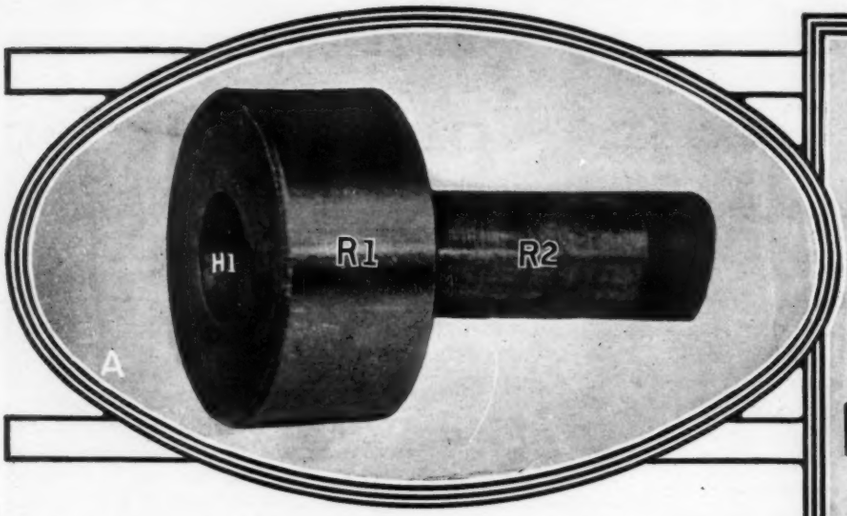
A maker of an automobile, under the circumstances, holds the purchaser's money in trust after he gets it, and he is entrusted with the plan of generating the securities, such as will justify the purchaser in his process of drawing money out of a bank and placing it at the disposal of the maker of a car. In the light of a "trust," if this is the part that makers of automobiles play, they betray that trust unless they so provide that the automobiles when made will work, but this is not enough; means must be provided whereby the automobiles may be kept in service in the face of the fact that a crankshaft may be disrupted, or other parts may go awry, and to replace them in the natural course is the remaining thing to do, which is rendered possible if repair parts are kept in stock, and if they will fit in the places for which they are intended.

It seems to be a characteristic of human nature that the man who does the poorest job promises the best return, and, unfortunately, it seems to be the characteristic of the average purchaser that he is in a great hurry to part with his money, and he will give it to the first man who demands it of him, if only the fellow who makes the demand will present his brief in a positive tone. The responsible makers of automobiles are the greatest sufferers from the practice on the part of purchasers of accepting promises instead of investigating cars, and the only hope, perhaps, that a cure will be effected in the long run, is reflected in the knowledge that a substantial future and regular dividends are only promised to the manufacturer who has a high aim, and who follows the bent of a natural inclination along equitable lines, persistently, and without faltering by the wayside at the beckoning of caprice.

There Is More to Be Done Than the Mere Furnishing of Interchangeable Repair Parts

Even if repair parts are made by an interchangeable process, under close limits of tolerance, it remains for the user to get a repair man who will substitute them for the worn-out parts, and the ease with which a substitution can be brought about depends entirely upon the design of the car, and the acumen displayed by the designer thereof in his arrangement of the relating members, nor would it be too much to expect that the parts may be assembled and put back again without great difficulty; moreover, fixtures of one kind or another might well be afforded through the maker to the repairman to the end that the cost of repairing will be reduced to a minimum, and mistakes will be suppressed.

It would be too much of an undertaking to go through a whole automobile for the purpose of showing that there is yet room for improvement in the manufacturing process, and it



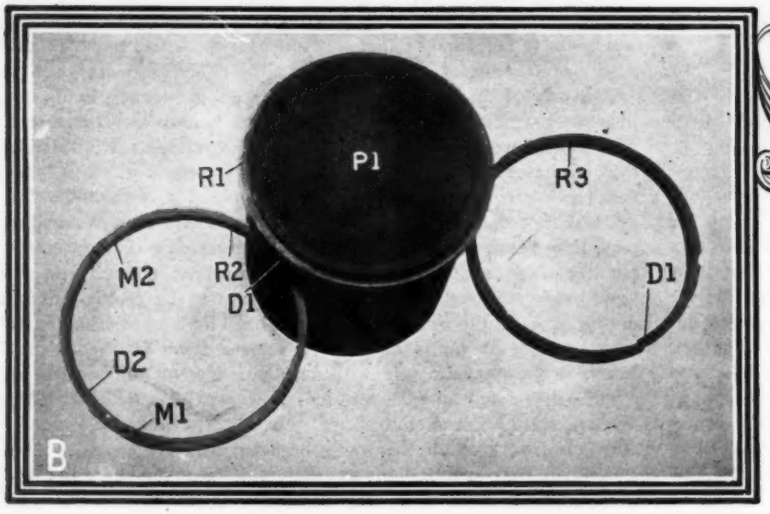


Fig. A—Showing a roller and a pin, the latter being over sized, both of which were hardened and ground, making the fitting operation a precarious undertaking

Fig. B—Showing a piston and a set of rings that were furnished for repair purposes, without any evidence of a fit between them

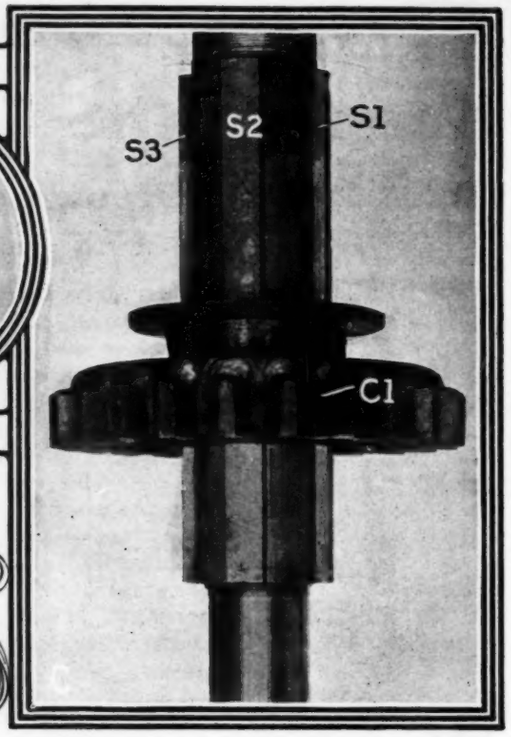


Fig. C—Showing a splined prime shaft for a sliding gear system so lacking in clearance that the sliding gear would not fit on the same, making no allowance whatever for the effect of torsional work

must suffice for the time if a few illustrations are given, and the problems involved discussed in connection therewith.

Referring to the sliding gear system, remembering that the principle involved is rather too crude to be commended, attention is called to the prime shaft, as shown in Fig. C, as it usually obtains therein, in which the splines S1, S2 and S3, of which there may be an odd or an even number, with a maximum limit of eight, and to the gear G1, which slides thereon, for the purpose of calling attention to the troubles that reside therein, and are inherent in the design. This shaft must transmit the torque of the motor at the various speeds at which it is driven, and the gear thereon must be capable of sliding during the torquing interval, and coupling this fact with the idea that the shaft will twist as it is subjected to the torquing movement, it is not difficult to foresee that the splines will take on a spiral conformation and the gear will stick unless the clearance is adequate for the need, and, unfortunately, the amount of the clearance cannot be fixed under static conditions with certainty, nor should the clearance be expressed in some proportion of the diameter of the shaft, due to the fact that the effect of the spiraling of the splines will influence the sliding of the gear, depending upon the length of the hub of the latter, so that the clearance as it is allowed should depend upon the length of the hub of the gear, increasing with the same in some proportion that must be determined by finding out how much the shaft will twist under maximum conditions of work, and to what extent the twist in the shaft will eat up the clearance between the faces of the spline and the mating member. The thought is suggested that gear shafts of this character would be of relatively great diameter, and as short as possible, for then the twisting effect of the torquing moment will be reduced to a minimum, and the clearance requirement between the spline shaft and the sliding gear will be reduced to a low ebb. It is a great misfortune that the modulus of elasticity of the finest grades of alloy steel is scarcely better than the same phenomenon in the poorest grades of Bessemer bar. If there is no difference in this modulus between the several grades of steel, it may then be taken for granted that the twisting moment will produce a torsional angle that will be the same for fine alloy steel as for poor Bessemer bar. Safety, under the circumstances, lies in fixing the clearance in view of the torsional angle under maximum conditions of the torquing moment, considering the diameter of the shaft in conjunction with the length thereof, and then, remembering that if the hug of the sliding gear is long the clearance will be eaten up in proportion to this length.

What the Purchaser Pays for When the Parts Are Not Made Interchangeable

In the reduction of parts to get them on a basis of accuracy, if they are done in a lathe, the raw material is chucked and the finished work is progressed, fixing the ultimate diameter of the finished work in relation to the centers of the tool, and if the work is ground as a final operation, these centers are taken advantage of, and concentricity is maintained. But when the parts are put through the last operation, it is not uncommon to remove the centers, and, referring to Fig. D of a tappet that was supplied by a maker, in which the tappet T1 with its roller R1 would not go into the housing H1, it will be seen that the cost of fitting this tappet in its guides within the housing H1 would far exceed the original cost of making the same, because the tappet T1 is hardened, and to give this poorly fitting repair

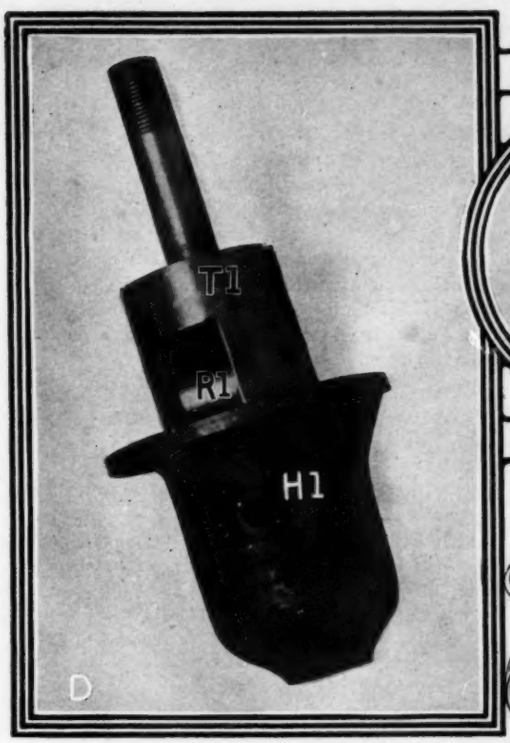
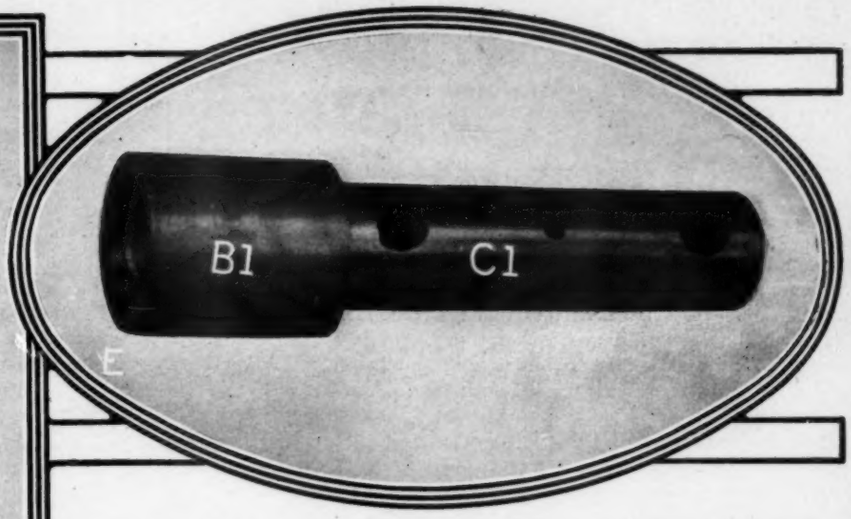


Fig. D—Showing a tappet that would not go into a guide, thus indicating that the parts would have to be refinished before they could be employed by the owner of the car



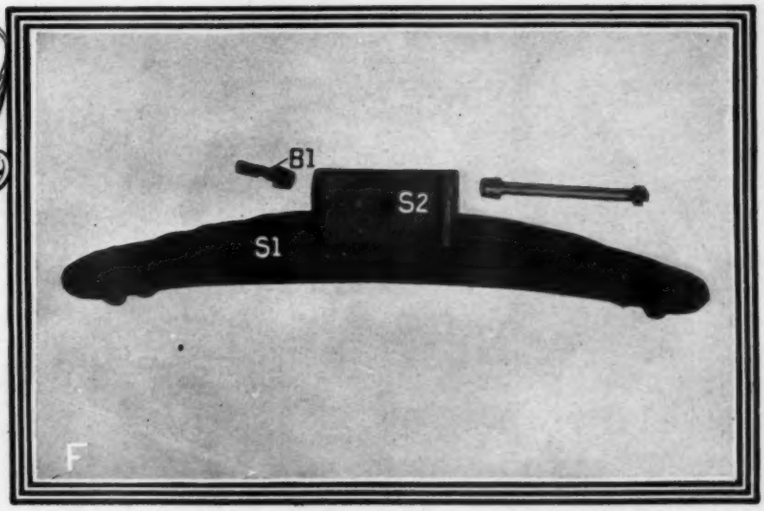


Fig. E—Presenting a piston pin that is over-sized and a bushing that came with it from the maker for repair purposes

Fig. F—Showing a flat plate set of springs with a saddle and a holding bolt that shows evidence of poor clamping conditions

material to a man in a garage is to ask him to disassemble the relating members, anneal the tappet T1, chuck it true in a lathe (repair shops are rarely equipped with grinding machines), and take off two or three-thousandths of an inch. The most skilled man in a regiment of machinists would scarcely promise the desired result, and the suggestion is ventured here that the most skilled man in a regiment of machinists is scarcely likely to be found hanging around a garage repair shop. Why the purchaser of an automobile should have such ill-fitting repair parts inflicted upon him in view of the fact that they represent a license for an enormous repair bill, is beyond the reckoning of thinking men, and yet it must be quite plain to those who give the subject thought that getting repair parts that fit is the exception rather than the rule.

As another example of what the repair situation affords, Fig. A is given of a roller R1, showing the roller pin R2, which was found to be too large in diameter to fit in the hole H1. These members were hardened and ground, and it would have been a perfectly simple matter for the man who did the grinding in the first place to come within decent limits of tolerance so that the pin would fit in the hole, thus making it worth while to get the repair parts and to use them for their intended purpose. The real situation is quite different. The cost of lapping the hole in the roller, or chucking the pin for the purpose of grinding the same, would greatly exceed the initial cost of the repair parts, and, unfortunately, the owner of the car is charged for the repair parts, despite the fact that they are not properly made, and he is then charged for the fitting of them, and he may as well understand that the garage repairman will have no qualms of conscience if the fitting work turns out to be a bungle.

Still another example of lack of fit of repair parts as shown in Fig. E of a gudgeon pin G1 and a bronze bushing B1, in which it will be seen that the gudgeon pin is over-sized, unless it may be said that the hole in the bronze bushing is under-sized. The maker of this job would probably claim that it is better to do a little fitting than to find when the repair parts are received that they are too loose to be used, but from the purchaser's angle it is not too much to maintain that the repair parts should be of the right size, thus eliminating fitting on the one hand, and making it unnecessary to use them if they are too loose as the remaining consideration. There is grave doubt as to whether or not the repairman can lap these members and make them fit properly, but there is no doubt that the time has arrived in the automobile business when the user of a car can ill afford to go about in a "rattle box," and we are keen enough to observe that automobile makers themselves use silent performers.

Fitting Must Be Done from Two Points of View

In some of the relating members, the close fitting work required is for the purpose of preventing noise, if we may take it for granted that the parts are big enough to serve the purpose from the strength point of view, but in other examples the close fitting idea has for its purpose the maintenance of a high efficiency. To bring out this latter consideration, reference may be had to Fig. B of a piston with a set of rings, and attention is called to the fact that the rings, as they came from the maker, were such a poor fit that they could not be used at all. The piston P1 was of the three-ring type, and the ring R1 was so much over-size that it could not be dropped into the slots at all; the ring R2 was marred at M1 and M2, and it fitted tightly in the slot at the diameter D1 and loose in the slot at the diameter D2.

From all appearances this ring must have been finished on a "skew-grinder," although we never heard of such a machine before. The ring R3 dropped into the slot with far too much clearance, and when this ring was piened at the plant where it was made it was thrown out of round, as shown at D1. There is no reason at all why a maker of cars should expect that the user of the repair part would have them refashioned in a garage repair-shop either on the count that they would be improved in the process, or on the ground that the automobile would be benefited thereby. It is not believed that the makers of automobiles labor under the impression that the class of work done in their plants is so inferior that it has to be finished in a garage repair-shop before it can be put in an automobile, and yet the facts on the face of it go to show that in quite a number of instances it would be impossible to use these repair parts excepting after the garage repairman adds his quota of work.

Of the things that give trouble in automobiles, it is more than likely that springs occupy the position of the head of the class. Every spring maker is authority for the statement that spring plates will fail unless the clamping at the perch is secure, and yet the facilities for clamping purposes are too frequently of the weakling order, and if spring makers insist that the clamping must be tight, we wonder if they expect the owner of the car to ride on the axle and hold the springs in place with his hands. Fortunately, the more advanced representatives of the spring makers' art are paying particular attention to these matters, and that they are getting reward for their acumen is too self-evident to require further discussion. Fig. F shows a spring S1 with its saddle S2, and the clamping bolt B1, and as proof of the fact that the clamping is insecure, attention is called to the initial illustration, showing the clamping bolt B1 as it came out of the car, indicating that the spring plates were not clamped tight, and that the bolt was sheared at S1, with a less effect of this kind at S2, and indication of the same trouble at S3.

It would be monotonous to continue examples of poor fitting repair parts as they come from the makers of automobiles, and to continue to relate the inconsistencies of those who tell us how things should be done, and give us the type of facilities that are only capable of violating the very principles that they so refreshingly propound, and the thought is suggested that the time has nearly arrived in the automobile business when we would like to experience the monotony that might be reflected by a reversal of these poor practices, rather with the expectation that the investment would be more nearly conserved, and the pleasure that is claimed for automobiling would be experienced without a too frequent jarring note.

"Pop" Goes the Carbureter

Relating some of the causes that bring about this undesirable habit in carbureters, and setting forth a number of remedies that will prove efficacious in abating the nuisance.

POPPING in the carbureter is due primarily to the fact that the speed of travel of the incoming mixture is below the speed at which the flame propagates in the same. When the mixture is ignited in the cylinder of a motor it burns with a certain speed depending upon the proportion of gasoline to air, and also to the amount of the compression, conditions of scavenging and temperature. The speed at which the mixture passes through the intake depends first upon the depression, or difference in pressure, and second upon the size of the intake manifold. If the manifold is too large the speed of the gas will be so low, all other conditions being fixed, that the flame will travel back into the carbureter, producing the phenomenon complained of. The way to overcome this difficulty is to use a manifold small enough in area to bring about the desired speed of travel of the gas in the direction of the cylinder. A way to reduce the tendency to this is to lower the inflammability of the mixture; this may be done by adding gasoline to the same. The latter may be accomplished by increasing the depression in the depression chamber of the carbureter, and this is brought about by reducing the quantity of auxiliary air admitted. But if the manifold is so designed that popping back takes place due to bad distribution, there are only two ways that we now think of for overcoming the trouble. The first remedy lies in the replacing of the defective manifold with one that is properly designed. The second remedy depends upon so timing the motor that there will be a definite lapse of time between the closing of the inlet and the opening of the exhaust valve. If the exhaust valve is closed 10 degrees after center, and the inlet valve is opened 15 degrees after center, the difference represented by 5 degrees will be sufficient to overcome the trouble, it is believed. In addition to this timing remedy, it will be well to adjust the carbureter so that it will deliver a somewhat richer mixture than it does when popping occurs.

As to Wind Resistance

It is not necessary to consider wind resistance in connection with the power required to drive the average pleasure car until the rate of speed reaches well along above the legal speed limits set by the various States. A formula for determining the power required to overcome wind resistance is here given.

WIND resistance in the case of a moving automobile is scarcely a measurable quantity at 20 miles per hour; is not more than 3 pounds per square foot at 30 miles per hour, and does not reach 10 pounds per square foot until the speed is equal to 52 1-2 miles per hour in round numbers.

A formula for use in approximating the power required to overcome wind resistance is given as follows:

$$HP = \frac{PA\ (M\ 5{,}280 \mid 60)}{33{,}000} = 0.96\ PAM$$

In which

HP. = horsepower required to overcome wind resistance.
P = pressure of wind in pounds per square foot.
A = front area of body in square feet.
M = speed of car in miles per hour.

Assuming a car with a front area of 10 square feet and a speed of 60 miles per hour, the power required to overcome this wind resistance will be:

$$H.P. = \frac{13 \times 10\ (60 \times 5{,}280 \mid 60)}{33{,}000} = 20.8$$

It is not believed that this formula will hold out for all ranges in speed, nor can it be said with certainty that the front area total will be correctly stated if the areas of all the parts without respect to shape or location are figured in on the same basis.

COMPRESSION CHANGES WITH SPEED OF MOTOR—In poorly-designed motors the "cold" compression represents the highest point in the compression line. With such motors as the speed increases the compression decreases. This is due to wire drawing and some other obstructions to some extent and to back pressure on the exhaust side and inferior cooling for the rest. In fairly well-designed motors the compression increases with the speed of the motor for a part of the range, holds substantially constant over the working range and falls off slowly with increasing speed beyond this point.

CARING FOR THE ACETYLENE LAMP—The burners of acetylene headlights should be kept clear, wires being passed through the gas apertures and the air apertures at intervals. The burners should be unscrewed occasionally and blown through, and the interior of the burner body scraped clean of deposit. Outside of keeping the lenses and glasses bright and polishing the exterior of the lamp, there need be no other attention paid except to keep all joints and the bracket screws or nuts tight.

Aphorisms for the Automobilist

DON'T hold up your hand like a member of the traffic squad and think that the automobile business will stand still at your bidding.

DON'T standardize your mistakes and try to inflict them upon an unsuspecting public.

DON'T ask the steel man to fix the standard for you; he may be a quantity producer.

DON'T be too solicitous about the steel man's dividend; he will get by whether you do or not.

DON'T do yourself the injustice of assuming that you are so short of brains that you must get a steel man to act for you.

DON'T violate the established principle of purchasing—the purchaser must look out for himself.

DON'T break the law of commerce by asking the vendor to be your guardian.

DON'T charge a high price for an automobile that is made out of materials that are delivered according to the suggestion of the vendor.

DON'T place too much store upon the promise of quality; thirty minutes in a laboratory will suffice to settle the whole matter.

DON'T purchase an automobile without first finding out enough about it to satisfy you that it will serve its intended purpose.

DON'T be too sure that progress in automobile designing is leading to the end of a blind alley.

DON'T do yourself the injustice of thinking that so much automobile brains can be spilled for nothing.

DON'T be satisfied to ride on a band-wagon if the driver thereof admits that he has reached the end of the road.

DON'T go back on your own good sense—finality never will be reached in any progressive art.

DON'T class automobile designing with dead languages—it is a living issue.

DON'T take anybody's word for it—if you have misgivings visit some of the plants, and you will then see that advances are being made all along the line.

DON'T encourage the ego that your motor is the last word—your neighbor may have one that will put you out of joint.

DON'T try to sleep on the idea that a sliding gear can play dog in the manger forever—the silent chain is coming over the hill.

DON'T accept a design from your engineering establishment if it makes a noise—the time is not far away when it will be impossible for you to sell noise in any form.

DON'T place too much store upon the croakings of the alleged expert who tells you that a worm drive is a difficult thing to make—nearly every elevator in the land takes its ups and downs with equanimity through the good office of a worm drive.

DON'T overlook the splendid possibilities that center around the worm drive and silent chain.

Soldering Aluminum

The low melting point of aluminum and rapid oxidation of the surface stand in the way of a successful job. The best plan is to first "tin" over the surfaces using a solder with a high zinc content, and then join them together before they cool off.

ALUMINUM alloys used in castings for automobile work, while they differ as to composition to a considerable extent, hold from 90 to 92 per cent. aluminum, the balance being copper, manganese, a trace of iron, etc. In attempting to solder aluminum, the first difficulty encountered is due to its low melting point. With copper it is possible to tin the surfaces when they will remain in good condition, and may be soldered by the mere application of a sufficient amount of heat at the right temperature, with no danger of damaging the metal by overheating, nor is there any tendency to oxidation. Aluminum, on the other hand, can scarcely be cleaned sufficiently to permit of "tinning," due to the fact that oxides form so rapidly that they interfere with the tinning process even though the work be done speedily. In order to solder aluminum it is necessary to heat the parts to be joined up to the melting point of solder, and after the surfaces are freed of moisture they must be cleaned by scratching with a metal brush, after which, if a suitable grade of solder is allowed to melt and run over the newly scratched surfaces, using the brush to bring about intimate contact, the solder will adhere to the surfaces, thus completing the tinning process. The solder must be made up of zinc (predominating), some tin and a small proportion of aluminum. The best way to proceed is to first bring about a condition of tinning as above indicated, using the solder high in zinc, and when the surfaces are tinned over join them together before they are allowed to cool off, thus preventing the formation of any oxide.

Tire to Travel on Rails

THERE are thousands and thousands of square miles of land where no good roads are found, but where the rails of the railways could readily be made to serve as a fine pathway for automobiles if the latter were equipped with the kind of tire that permits of running on steel rails without the risk of coming off easily. It is for the inhabitants of such regions that the new invention illustrated herewith will be of interest, because it enables an automobile to travel on standard rails with speed and safety.

The principle of the invention is the temporary transformation of the automobile wheel into a wheel of standard railroad wheel periphery, and the illustration shows how near the flanged effect of the wheels used on railway cars has been approached. The mechanism itself, as termed by the patent of the inventor, is a supplemental tire comprising a member which has an annular tread surface. This member has a concavity for receiving the wheel, and there are provided retaining devices to secure the wheel to the tire; also, there is a guard flange which extends outwardly from one side of the annular tread surface.

To make the automobile ready for running on rails the regular tire is deflated, the supplemental tire placed over it and the pneumatic then filled with air, so as to make it a snug fit in the supplemental tire. When this has been done and the retaining devices have been properly put in place the car is ready to be propelled on a railway track in exactly the manner of a locomotive.

This new tire is the patented invention of A. P. Burrus, whose residence is Prescott, Ark.

Illustrating an automobile traveling on a railroad track, which has been equipped with a set of Burrus supplemental tires

Alloy Steel for Automobiles

Advocating a Near Approach to a Definite Standard

E. F. Lake presents views bearing upon the production and use of alloy steel with particular reference to its application to automobile construction, taking occasion to differentiate between quantity and quality production, pointing out in the meantime the characteristics of the various processes and setting forth in terse language the ground that should be taken in the limiting of the impurities and the fixing of the carbon content.

THE kind of high grade alloyed steels to use for the various vital parts of a motor car is a very live subject, notwithstanding the fact that vast sums of money have been spent and a large amount of time used in experimenting, investigating and testing the numerous kinds of steels, as well as the various ingredients that entered into their composition.

Numerous standard specifications have been adopted by various bodies for the guidance of the engineer when designing an automobile or ordering the material from which to manufacture it. The tendency at present seems to be to allow for quite a variation in the percentage of the ingredients that go to make up these alloyed steels and thus make it much easier for the steel makers to supply the stock. While this may enable the builders to obtain steel when they are rushed to fill orders, it does not help them in keeping the automobile up to that high standard of excellence that has given it its reputation and made it one of the finest pieces of mechanism ever manufactured.

Many new materials have been brought into use for the manufacture of high grade steels. None, however, have excelled, or even equaled, the static or dynamic strengths of the chrome-nickel steels. These still occupy first place when quality alone is the test by which they are judged. The much advertised vanadium steels have shown some good properties, but when submitted to various kinds of tests, they have not taken the place of chrome-nickel steels. Likewise, an effort has been made to make the nickel steels replace the chrome-nickel steels for quality, but without success. Copper, tin, boron, cobalt and other elements have been experimented with to obtain steels of greater strength and wearing qualities, but none of these have yet been made commercially successful.

The different elements produce different results in the alloys of which they form a part. The effects of carbon were discussed on page 908 of volume 24, hence it will not be necessary to take up the effect of this element here.

Chromium occurs in nature in the mineral chromite more commonly called chromic-iron-ore or chromic iron. It is very hard, has a bright metallic luster and can be highly polished. Until the advent of the electric furnace it could not be used successfully as an ingredient of steel owing to the difficulty of separating it from the high percentage of carbon with which it was combined. Carbon-free chromium is now obtained, however, and for steel making is used a ferro-chromium containing 60 per cent. chromium and 40 per cent. iron.

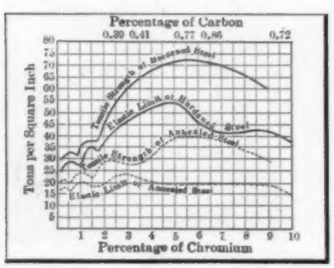

Percentage of Carbon
0.30 0.41 0.77 0.86 0.72
Tons per Square Inch
Tensile Strength of Hardened Steel
Elastic Limit of Hardened Steel
Tensile Strength of Annealed Steel
Elastic Limit of Annealed Steel
Percentage of Chromium

Fig. 1—Effect of chromium on the tensile strength and elastic limit of steel

Chromium has a tendency to prevent the development of the crystalline structure and greatly refines the grain of steel. It also produces a mineral hardness.

When the steel is properly hardened, the tensile strength and elastic limit gradually increase with each increase in the percentage of chromium up to a content of 5 per cent. In the annealed state the raise in elastic limit ceases when 3 per cent. of chromium is reached and remains nearly stationary until a chromium content of 9 per cent. has been passed. The tensile strength continues to rise until 6 per cent. has been passed. Beyond the above given percentages a decided reduction takes place. A graphic illustration of this rise and decline is given in Fig. 1.

Any grain or fiber that may be in the steel is practically removed by chromium, and as it also produces a fine grain and hardness. The chromium steels have a high resistance to shocks This has caused chrome steels to be used quite extensively for projectiles and armor plates. Chromium adds to the difficulty of machining steel; when a chromium content of 2 per cent. has been reached, machine tools will not cut it and grinding has to be resorted to. It is also very difficult to shear cold.

Chromium causes the critical changes of steel to take place much more slowly and intensifies the sensitiveness of the metal to quenching. Thus extreme hardness may be obtained. The tendency to fracture that is found in carbon steels is greatly reduced by chromium.

The hard machining qualities and brittleness of chromium steels makes them useless for automobile construction. By adding nickel, however, these detrimental properties are overcome to a large extent. When the proper percentages of nickel and chromium are used the strongest, toughest and best wearing steel obtainable can be made and the metal can then be forged and machined.

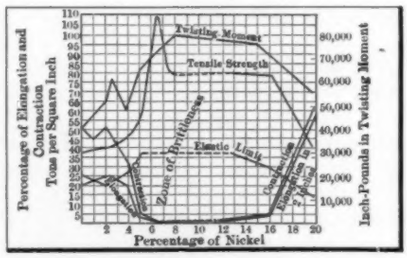


Fig. 2—Depicting the strength of nickel steel in the annealed state

The alloyed steels give a much greater strength, per square inch, than the ordinary carbon steels, when they are properly manufactured and heat-treated. Thus parts requiring their use can be made smaller in section and hence lighter. This difference in weight, as well as the power required to carry it around, will often make up for the difference in the cost of the metal, if a little judgment is used as to where the high grade steels should be used. Many have made a failure however, by a too liberal use of the high-priced steels.

One of the best grades of nickel-chrome steel has the following composition:

Nickel	4.50%
Chromium	1.50%
Carbon	0.25%
Manganese	0.35%
Silicon	0.20%
Sulphur	under 0.025%
Phosphorus	under 0.025%

A steel of this composition when well made will bring about

12 cents per pound in the bar form and the chromium and nickel should not be allowed to vary more than 10 points either way from that which is specified; the carbon, manganese and silicon should be within 2 1-2 points of that mentioned, while steels may be obtained with the sulphur and phosphorus considerable under the figures given. A low corban steel with the carbon below 0.20 per cent. is made for carbonizing purposes. No better steel has been found for manufacturing the clash gears for the transmission than this low carbon-nickel-chrome steel, when it is properly carbonized and heat-treated. It is then almost impossible to break out the gear teeth.

When a range of 50 points is allowed in the nickel and chromium contents; 10 points in the carbon; 20 points in the manganese and silicon, and the phosphorus and sulphur are allowed to be as high as 0.04 per cent., it means that the steel can be made in any kind of a slip-shod way. It means that the steel can be made in the open-hearth furnace when one is paying for a crucible product, or with the proper selection of materials it might even be made in a Bessemer converter. Imagine, if you can, a Bessemer-nickel-chrome steel!

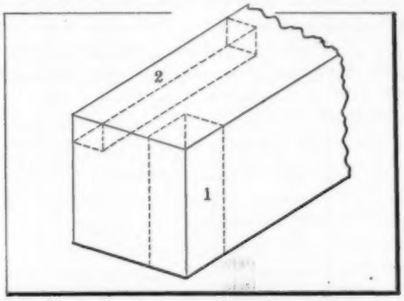


Fig. 3—Showing how test bars are cut from the actual parts in practice

No better steel than this can be obtained for the crankshaft, and it is also advisable to use it for the camshaft and cams, connecting rods, steering knuckles and front axle of a car. It is not advisable to use it in other places unless extreme lightness is desired, as in a racing car. The front axle and steering knuckles should always be made of this steel, as it is a preventer of accidents.

Another steel that analyzed as follows has been used for all the important parts on a motor car:

Nickel	4.21%
Chromium	1.64%
Carbon	0.32%
Manganese	0.40%
Silicon	0.10%
Sulphur	0.37%
Phosphorus	0.010%

While the sulphur is a little higher than should be allowed in any first-class steel, this particular brand has given very excellent results. It is not as easily obtainable, however, as the former composition and the price is somewhat higher. It has therefore not been used to any extent in this country, as the differences in quality or the results obtained are not enough to pay for the extra expense and trouble of obtaining it.

Another steel that is used for many parts in the best classes of foreign cars has the following composition:

Nickel	2.50%
Chromium	0.60%
Carbon	0.35%
Manganese	0.40%
Silicon	0.10%
Sulphur	0.031%
Phosphorus	0.028%

Sometimes the nickel in this steel is found as low as 2 per cent. It has found a large use for oil tempered gears. It is cheaper than the higher chromium and nickel steels mentioned above, and the sulphur and phosphorus are too high for it to be classed as a first-class steel.

When we leave the chrome-nickel steels, the next most important for automobile manufacture are the nickel steels. In these the nickel varies from 2 to per cent., but the 3 1-2 per cent. nickel steel is by far the most extensively used.

Nickel is a white metal with a slightly yellow cast, and is very hard and capable of being highly polished. It is usually found with copper and is very brittle when first separated; but when deoxidized with manganese it becomes very malleable. It was first used in steel to overcome the property of "sudden rupture," which is inherent in all carbon steels.

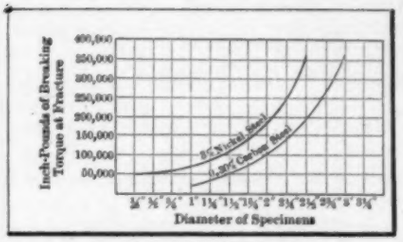


Fig. 4—Torsional tests of mild carbon steel in comparison with nickel steel

Nickel makes steels better abled to withstand severe shock and torsional strains as well as compressive stresses. It only hardens steel to a slight degree and requires 17.55 per cent. of nickel to equal the hardening effect that 1.00 per cent. of carbon would give.

Nickel increases the tensile strength and elastic limit of steel as well as its ability to withstand torsional strains up to a content of about 8 per cent. With a nickel content of from 8 to 15 per cent., the steel is made so brittle it can be powdered under a hand hammer but after 15 per cent. is passed the toughness and strength is restored. This is graphically shown in Fig. 2.

Nickel greatly reduces the tendency of steel to be damaged by overheating and hardening greatly increases the strength of the metal. This was well illustrated by some tests in which an annealed steel gave the tensile strength of 88,000 pounds per square inch and an elastic limit of 60,000 pounds, with an elongation of 28 per cent. and a contraction of 58 per cent. When the steel was hardened the tensile strength was raised to 225,000 pounds and the elastic limit to 224,500 pounds. The elongation then was 8 per cent. and the contraction 19 per cent. These figures would also show that in the annealed state it was no stronger than an ordinary carbon steel, but that hardening raised the figures to a point that could nowhere be approached by the carbon steels.

The properties of nickel steel depend as much upon the carbon content as on the nickel, and the manganese also has an influence. It is the skillful blending of the carbon, nickel and manganese elements that gives nickel steel its superior qualities, when properly heat-treated. The metal is also as weak or weaker than ordinary carbon steel, if these are not properly done. To boast, therefore, that one uses a 2 or 3 1-2 per cent. nickel steel is merely idle talk. A steel containing 2 per cent. of nickel and 0.12 per cent. of carbon has a good tensile strength with a great elongation and is thus useful in some places; but a steel containing 2 per cent. of nickel and 0.90 per cent. of carbon has a high tensile strength with very little elongation and is thus useful for other purposes.

When the carbon content is high, nickel makes steel difficult to harden as fissures or cracks tend to develop in quenching and more especially so if local hardening is resorted to. It also has a tendency to decarbonize when being heated and also to warp more than other steels when quenching. These tendencies may be overcome to a great extent if the metal is thoroughly annealed before machining it to size.

A decided grain, or laminations, have a tendency to develop in nickel steels and these make it stronger in the direction in which it is rolled than at right angles thereto. The difference in strength in these two directions increases as the nickel content is raised. When bars 1 and 2, Fig. 3, were cut from a 3.35 per cent. nickel steel and tested, bar 1 showed an elongation of 12 per cent. and a contraction of 17 per cent., while bar 2 gave an elongation of 25 per cent. and a contraction of 65 per cent.

Nickel tends to decrease the segregation of the various elements in steel and increase its tensile strength without lowering the ductility. When 2 per cent. of nickel is added to an open-hearth 0.25 carbon steel it produces a metal that is equal in tensile strength to an ordinary 0.45 per cent. carbon steel.

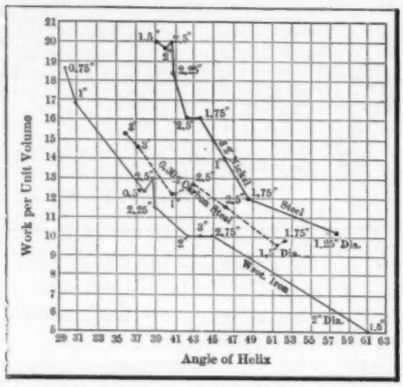


Fig. 5—Torsional tests of wrought iron, mild carbon steel, and nickel steel

It brings the elastic limit up close to the ultimate strength without sacrificing ductility and thus increases the resistance to molecular fatigue. Nickel steels resist bending either before or after quenching better than ordinary carbon steels of the same tensile strength. That nickel steel resists torsional strains better than carbon steel of the same carbon content is graphically shown in Figs. 4 and 5. These are the average results of a number of tests, and in Fig. 5 some wrought-iron samples were tested for comparison. Nickel steel withstands abrasive wear much better than ordinary steels.

Some of the higher percentages of nickel, *i. e.*, above 15 per cent., are used in steel for their non-magnetic qualities and a 35 per cent. nickel steel has often been used for valves. It has been found, however, that cast iron is as good as any metal, and better than most other, for the valves of automobile engines and hence the high nickel steels are not used exclusively to-day. Steels can be bought in the open market with nearly any percentage of nickel that is desired, but for automobile use the 3 1-2 per cent. nickel steel is doubtless the best. A good composition for this steel is:

Nickel	3.50
Carbon	0.25
Manganese	0.40
Silicon	0.20
Sulphur	under 0.35
Phosphorus	under 0.35

Nickel steel is used for nearly all of the important parts of a motor car, owing to its being higher in both static and dynamic strengths than ordinary carbon steels. It does not, however, show the strengths that chrome-nickel steel does, but it is cheaper in price. Being much easier to machine than chrome-nickel steel, this also lessens the cost of the various parts. Nickel steel is a very valuable metal, but if the specifications allow the impurities to be as high as some steel makers would desire the good qualities conferred on the steel by the nickel would be neutralized and no better results obtained than with ordinary carbon steels. Nickel steels must also be properly heat-treated if they are to be made better than ordinary carbon steels. The loss of strength that steels encounter from a raise in temperature is shown in Fig. 6.

Of the vanadium steels very little, if any, vanadium is present in the finished product and hence "vanadium" steel is a misnomer. Vanadium has a great affinity for oxygen and also for nitrogen and if added to the bath just before teeming into the ladle it will seize these and carry them off into the slag. By thus scavenging out the oxides and occluded gases it retards the formation of blow-holes and the segregation of the carbides and makes the metal more homogeneous and also more easily machined. Aluminum performs a very similar mission and yet we do not speak of "aluminum steels."

Vanadium of itself adds no virtues to steel. When it has cleansed the steel of impurities it has performed its mission. Thus it is as well to allow it to go off into the slag as to try and keep any in the steel, unless the steel maker wants to prove to the chemist that it is a vanadium steel. That slags can be used in an electric furnace to perform the same mission of purifying the steel has been thoroughly demonstrated and this may overcome the necessity of using as expensive an alloying material as vanadium.

Titanium is fast coming to the front as a purifying material, and like vanadium it has a great affinity for oxygen and to a slightly lesser degree for nitrogen. It thus seems to perform the same mission as vanadium and is only about one-twentieth of the price. While sulphur and phosphorus are not removed to any extent by titanium it removes the oxygen and nitrogen and prevents the formation of oxides and nitrides, which are now recognized as the real injurious substances. In some recent investigations it was demonstrated that sulphur in percentages as high as 0.13 per cent. had no injurious effect on steel and would not make it "hot short" when the other impurities were reduced to a trace.

Sulphur, when added to soft iron, increases the strength of steel, partly by closing the grain, and partly by increasing the combined carbon. It thus has a hardening effect on the metal. As it does not alter the elastic ratio, elongation or contraction, it might even be made beneficial to steel if the oxides and nitrides were removed. This would prevent the formation of sulphides and the segregation with sulphide of iron in the form of ghosts, which greatly weakens steel.

Aluminum is also used as a purifier of steel, but it like the vanadium and titanium, adds nothing to the strength of steel except by removing the impurities. Its effect on the strength of steel, when used in various percentages, is graphically shown in Fig. 7. Aluminum suppresses the evolution of gas, either by increasing the metal's solvent power for that gas, or by removing the oxygen, and thus preventing the latter formation of carboric oxide, or by both means jointly.

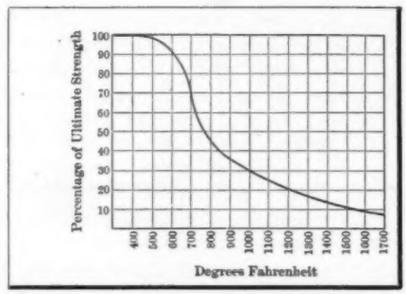


Fig. 6—Showing steel losses in strength due to a rise in temperature

This makes the metal more dense by removing the microscopic bubbles and also greatly decreases the tendency to segregation. Only enough aluminum should be used to cause this effect and then work out of the metal. If any remains in the steel it is liable to form into little balls and thus destroy the congenuity of the metallic structure.

Manganese is used in these steels as a carrier for the carbon and each increase in the carbon percentage requires an increase in the manganese percentage. Its presence increases the power of the carbon to combine with iron at a very high temperature, *i. e.*, around 2,550 degrees Fahrenheit. It almost entirely prevents its separation into graphitic carbon at the lower temperatures. By raising the saturation point, it permits a higher total carbon and prevents to some extent the red and yellow hot shortness caused by sulphur. Manganese alloys with iron in all ratios, it being reduced from its oxides, at a white heat, by carbon. It is easily separated from iron by oxidation as it is even oxidized by silica.

Manganese has a greater affinity than iron for both sulphur and oxygen and it is therefore used to do the rougher work in cleansing the bath of impurities and also neutralize the sulphur. That is, manganese is first used to oxidize out the impurities as thoroughly as it will. After that other slags and elements are used to remove that part of the impurities that the manganese has not seized. It increases the solubility in the steel, while solidifying, and retards the formation of blow-holes; it adds fluidity to the steel, increases hardness and slightly increases the tensile strength and elastic limit. The effect on the tensile strength that manganese has with various percentages of carbon is shown in Fig. 8.

Manganese adds certain very beneficial properties to steel, but these are not of any interest to motor car builders. The percentage of manganese is kept low in the steels used for automobile purposes. The variation in the manganese percentages that

is allowed in high-grade steels is usually about double the variation that is allowed for the carbon and when these are kept within reasonable limits a very uniform quality of steel can be obtained.

Silicon is added to the steels for much the same reason that manganese is, as both of these are used as purifiers, to prevent the formation of blow-holes and make the steel harder and tougher. The silicon especially makes the steel better able to withstand wear and crushing from continual pounding. The influence of silicon on the results of quenching are similar to that of carbon in many ways. It also depends upon the coexisting amounts of carbon and manganese. It neutralizes the injurious tendencies of manganese to some extent and up to a silicon content of 0.40 per cent. it increases the tensile strength and lowers the elongation and reduction of area.

The elements in steels that are classed as impurities should always be removed as thoroughly as possible in high-grade steels. While phosphorus and sulphur have their uses and might be beneficial to iron and steel products for certain purposes, there is no part on a motor car that would not be stronger and do the work it is called on to perform for a longer period of time if the phosphorus and sulphur were removed to the last trace. The bad effects of phosphorus do not show in the rolling mill or at any other time if the metal is kept fairly warm, but it gives steel that property called cold shortness and when the car is submitted to freezing weather or the parts subjected to cold temperatures a high percentage of phosphorus will cause the metal to be easily broken.

Phosphorus diminishes the ductility of steel under gradually applied load. This is shown when pulling specimens apart in the tensile testing machines by the contraction, elongation and elastic ratio. The rotary and alternating vibrational testing machines and pendulum impact machines show the decrease in ductility and toughness to even a greater degree.

Phosphorus has a tendency to cause coarse crystals to form and this is increased with each percentage of carbon. A certain percentage of phosphorus will dissolve in pure iron and no eutectic will form to produce brittleness. When carbon is added, however, each increase in percentage exerts an influence on the phosphorus that causes it to precipitate from the solid ferrite solution and take the eutectic form. Thus the more pure the iron and the less cementite that is in steel the less will be the brittleness that is caused by phosphorus. But each increase in the percentage of carbon increases the tendency for the eutectic to form and the steel to assume a coarser crystallization that makes it both weaker and more brittle. Phosphorus also increases the tendency toward segregation. As the electric furnace promises to give us steels with a phosphorus content below 0.015 per cent. and at a reasonable price, it may overcome some of these troubles.

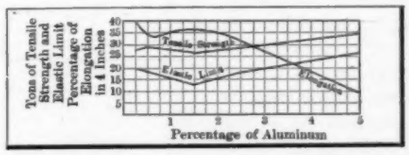


Fig. 7—Charting the effect of aluminum in various proportions upon the structure of steel

Sulphur combines with oxygen to form a dioxide that is liable to be trapped in the metal unless precautions are taken or slags used for its removal. When it is present in the form of sulphide the metal cracks, tears and checks when worked hot. This is the opposite effect to that given by phosphorus and has been termed "hot shortness."

When the steel is cold its effect does not seem to be detrimental to any extent. Like phosphorus, it increases the tendency toward segregation. When steel is heated beyond a dull red, sulphur in the sulphide form is claimed to cause a crystallization to take place. When high temperatures are reached the grain becomes very coarse as the sulphur dioxides and forms into a gas that diffuses between the iron crystals, thus separating them and preventing cohesion when contraction by cooling takes place. This is liable to cause microscopic cracks or even cracks large enough to be seen by the naked eye. These of course weaken the metal.

Where steels are heated in working, as in rolling, forging, hardening, tempering, carbonizing, etc., the sulphur content should be below 0.025 per cent. if the steel is really to be classed as a high-grade alloy.

The oxygen, hydrogen and nitrogen that are present in all steels are now being recognized as the real injurious elements, even though present in very small percentages. Being gases, however, it is only recently that these were found to be present in as large percentages as they really are. These three gases readily dissolve in iron or steel when it is molten, but if it solidifies they come out of the state of solution and much the larger part passes away. A portion, however, is usually entrapped, and if segregated in large bodies causes blow-holes, gas bubbles, etc. Carbon monoxide gas, which may be generated during the solidification period by a reaction of the oxide of iron with the carbon when carbonizing, is also a cause of blow-holes. These blow-holes are usually removed by such deoxidizers as manganese, silicon, aluminum, etc., but a portion may remain in the steel in the form of occluded gases and oxides, and to remove these takes more time than is willing to be granted by many steel makers. That they have a very weakening effect on steel is rapidly being recognized by most steel makers and such elements as vanadium, titanium, aluminum, etc., are being used to remove them from the metal, while the electric furnace process finds its greatest usefulness in that work.

Oxides show in black specks throughout the metal, but can only be seen when the surface has been perfectly polished and magnified at least 1,000 times. These are invariably found in steels that blister when being pickled. High-carbon steel rods containing these impurities occasionally fracture in the pickling bath and doubtless the same pressure that blows a blister in mild steel will cause a rupture in hard steel.

In some experiments that were made the oxygen content was found to be from 0.021 per cent. to 0.046 per cent. These might appear to be very small quantities, but it is necessary to consider the combinations that these elements form to obtain their real influence on the metal. When we speak of 0.05 per cent. of sulphur it is the 0.13 per cent. of manganese sulphide that in reality affects the quality of the steel. Oxygen has only half the atomic weight of sulphur and is capable of forming larger quantities of compounds. It therefore exerts greater influence. Where 0.05 per cent. of sulphur corresponds to 0.13 per cent. of manganese sulphide, 0.05 per cent. of oxygen corresponds to 0.22 per cent. of ferrous oxide. It was also found that the amount of oxide visible under the microscope was much less than that actually found by chemical analyses. Thus it can be seen that such a large amount of an impurity would have considerable effect on the metal.

In manufacturing steels, the Bessemer converter blows air up through the molten metal from the bottom and thus burns out a large part of the impurities, after which the bath is recarburized and the metal poured into ingot molds. It does not remove the sulphur and phosphorus to any extent, and these elements are consequently higher than in steels made by other processes. The bath also ab-

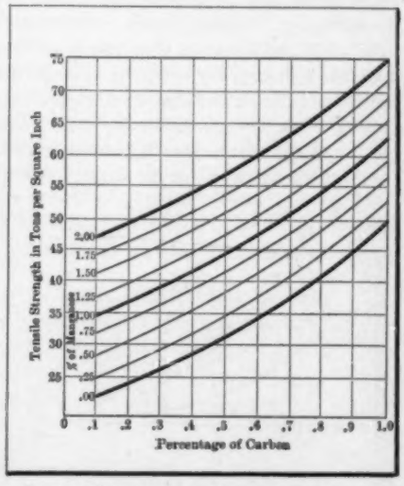


Fig. 8—Showing the effect of manganese on the tensile strength under various conditions of the carbon content

sorbs more oxygen from the air than with other processes, and oxides and occluded gases are therefore higher in Bessemer steels than those made with the open-hearth or the crucible.

The open-hearth process holds the molten metal on a hearth and the heat is absorbed from the top. The metal is covered with a slag to protect it from the air and also aid in removing the impurities. With this process the phosphorus and sulphur can be reduced to a lower percentage than with the Bessemer converter and the oxygen does not penetrate the metal to as great an extent. As there is a large volume of air over the molten metal, however, it works through the slag and penetrates the bath to a greater or less degree and there is a larger percentage of oxides and occluded gases present in the finished steel than should be allowed in steels of quality. In the open-hearth furnace it is impossible to remove the oxygen, nitrogen, hydrogen, or sulphur and phosphorus to as great an extent as with the crucible or electric processes.

With the crucible process, the crucibles are charged with materials containing the proper percentages and the crucible is then sealed. This keeps the outside air from attacking the metals and hence crucible steels do not have nearly as large a percentage of oxides and occluded gases as those made in either the open-hearth or Bessemer furnaces. The phosphorus and sulphur are also reduced to lower percentages.

With the electric furnace, steels can be taken from the open-hearth furnace after they have been purified as thoroughly as possible and slags can then be used that will reduce the sulphur and phosphorus to mere traces. By sending an electric current through the bath it does not absorb the oxygen from the atmosphere, and the oxides and occluded gases will thus be lower than with any of the other processes.

Electric furnace steels are doubtless the best for automobile work, but it is also possible to get excellent grades of steel from the crucible process. Open-hearth and Bessemer steels are not of the high grade that electric furnace or crucible steels are, for the various reasons that have been given.

In buying steels, therefore, it is as necessary to insist that one gets electric furnace or crucible steels, when paying for them, as it is to know the composition of the metal. In altogether too many cases open-hearth or even Bessemer steels are sold as crucible steels and while one cannot spend his time in the steel mill to be assured that he is getting the product he is paying for, he can spend time enough to be reasonably sure of the kind that is being purchased.

Theory of Multiple-Cylinder Motors

Discussing the Advantages of Plural Cylinders

W. D. Ennis, professor of Mechanical Engineering, Polytechnic Institute, Brooklyn, presents a phase of the automobile motor designing problem, taking for his basis the advantages of an increased number of cylinders over early practice, and telling how the plan works out as a matter of theory, reflecting the thought that, in practice, the results should be in accord with the deductions made.

A SOMEWHAT conventionalized representation of the action in a gasoline motor cylinder is given in Fig. 1. The co-ordinates of the diagram are pressures and piston movements. The line a b represents the drawing in of the supply of air and gasoline vapor, practically at atmospheric pressure (in a four-cycle engine) while the piston moves out. At b the inlet valve closes and the piston returns, the pressure rising as the gas is reduced in volume, giving the smooth curve bc. Ignition occurs while the piston is near the inner dead center. In the ideal diagram we may regard it as taking place exactly at the dead center, i. e., at c; the rise of pressure being instantaneous, from c to d, while the piston stands still. The piston has now made one complete revolution; but another revolution is necessary before the completion of the cycle. After ignition, the piston is forced outward by the burning gas, the pressure falling as the gas expands, producing the smooth curve de. Assume the exhaust valve to be opened at c, precisely at the end of the stroke, and the pressure in the cylinder to immediately fall to that of the external atmosphere, giving the line eb. The piston now sweeps back on its final fourth stroke, the charge being expelled, again practically at atmospheric pressure, along ba. We have now completed the cycle and the operation may be immediately resumed.

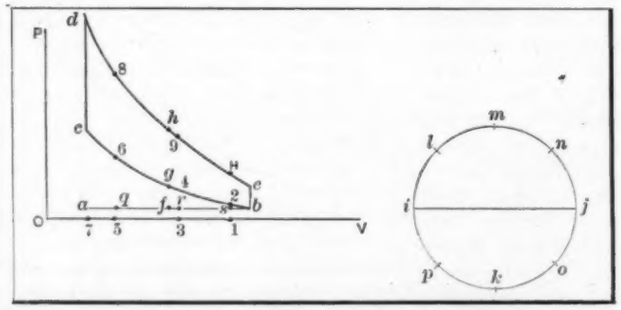


Fig. 1—Pressures plotted against piston movements, representing the several phases of a four-stroke cycle motor

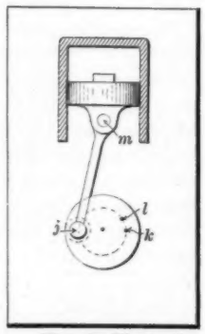


Fig. 2—Illustrating relative position of piston, crank and crank pin

The indicator diagram actually obtained from a four-cycle cylinder is less regular in form than the one shown, but it will answer for illustration purposes to adhere to the rather idealized lines of a four-stroke cycle of Fig. 1.

When the piston is at a, c or d, both it and the crank are on the inner dead center. When it is at b or e, both it and the crank are on the outer dead center. What is the crank position when the piston is at a point midway in its stroke, at f, g or h? Not, as might be hastily inferred, at its half-way down point, j, or k, Fig. 2: for the angle of the connecting rod is such that its fixed length brings the crank to a somewhat higher position, like l, when the piston is half way down. When the piston is up the crank is up; when the piston is down the

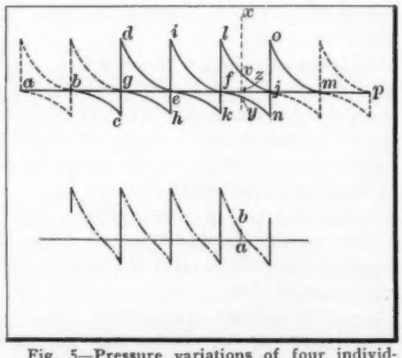


Fig. 5—Pressure variations of four individual cylinders in an engine, and practical result of their combination, showing reduction of pumping losses

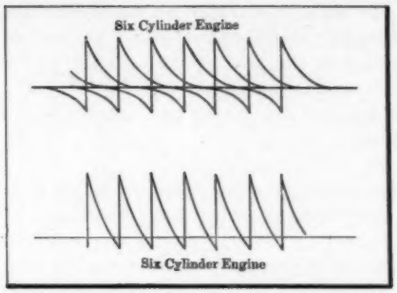


Fig. 6—Diagram of pressures in a six-cylinder motor, indicating how net pressure is forward during 70 per cent. of the time of operation

crank is down. There is no angularity of the connecting rod in these two positions. For all other positions the crank will be constantly higher than the point corresponding to that of the piston. If for each position of the piston we lay off from the pin center m a length m j equal to that of the rod, intersecting a circle through j e k made equal in radius to that of the crank, we shall have the crank positions for various piston positions.

Thus, in Fig. 3, let the piston stroke or travel of the pin m be represented as m n; which is necessarily equal to twice the crank radius. Let the distance m q represent the length of the connecting rod. Draw through q the circle o q p with a diameter equal to m n. Following the rule given, if we set the compasses to the length of the connecting rod (equal to m q or n r), and, using piston pin positions as centers, strike arcs intersecting the circle o q p, we find for the piston at m the crank at q; for the former at n, the latter at r; for the former at s, the latter at t; the latter at u when the former is at v; and so on.

The same construction can be directly applied to Fig. 1 if we show the length of the connecting rod in relation to that of the stroke. Suppose, for example, the former is twice the latter. Then in Fig. 1, the circle i j k may be regarded as that described by the crank, the distance a i being equal to twice the distance a b. We will now reverse the analysis and find the piston positions for various crank positions. Let the latter be i, l, m, n, j, o, k, p—45 degrees apart in angular measure. Setting the compasses to the radius a i, and using these eight points as centers, we obtain piston positions a, q, r, s, b; each of these excepting the first and the last corresponding with *two* possible crank positions.

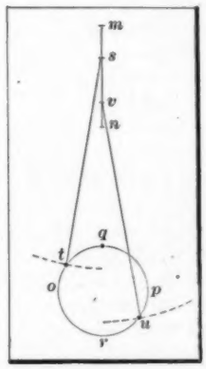


Fig. 3—Diagram of variation of piston pin position at the several stages of piston travel

Now return to the significance of the pressure-volume diagram of Fig. 1, as first explained. When the piston starts at a the crank is at i, and the pressure on the piston is measured by the distance from a down to the horizontal line OV. This pressure is maintained constant while the piston moves through q, r, s to b, the crank meanwhile moving through l, m, n to j. The crank now returns through the points o, k, p, the piston through s, r, q; but the piston pressures on this return (compression) stroke are 1 2, 3 4, 5 6.

We now consider Fig. 4. Here the horizontal intervals are proportional to the crank movements, and vertical distances represent pressures on the piston for the various crank positions. The use of letters with primes and subscripts is necessary because we shall deal with more than one revolution of the crank. In Fig. 4, then, the horizontal intervals being equal, and representing equal crank movements, we lay off pressures vertically to correspond with those shown by Fig. 1. The correspondence is not absolutely direct, however, because we must remember that during the compression stroke the pressure is resisting rather than helping the movement of the piston, and should be regarded, therefore, as a *negative* pressure, to be laid off *below* the horizontal line i R. Further, the diagram of Fig. 1 shows the pressures on the working side of the piston only; there is at all times, on the other side, the pressure of the atmosphere, practically equal to that registered along the line a b of Fig. 1. The net pressures with which we are concerned

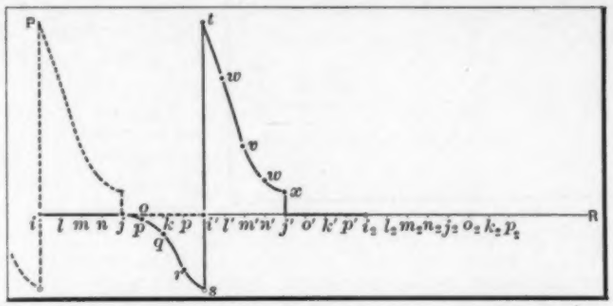


Fig. 4—Varying pressure during a four-stroke cycle plotted against the movements of the crank, indicating irregularity

are, therefore, only the differences between pressures shown on Fig. 1 and those of the atmosphere; or, graphically, the net pressure at 4, for example, is 4 r instead of 4 3.

Bearing these points in mind, there is no net pressure for crank positions from i to j, and the graph we are plotting will therefore correspond with the axis line iR between these points. Proceeding, we make op = s2, kq = r4, pr = 6q, i's = ac, i't = ad, l'u = q8, m'v = r9, n'w = s4, j'x = be, dropping from x to j' and working horizontally, without net pressure, to i_2. The broken line from i to i_2 now represents the relation between net pressures on the piston and crank positions for two entire revolutions. The pressure is obviously highly irregular, sometimes actually tending to stop the piston. Gas engines therefore need heavy flywheels, if the speed is to be uniform.

In the automobile a partial substitute for the heavy flywheel is afforded by the use of several cylinders. Suppose a second cylinder, in our own illustration, were connected with the same crank shaft, but that the crank pin of this cylinder were at i^1, Fig. 4, when that of the first cylinder was at i. A given piston pressure, i't, would then be exerted at the second cylinder one full revolution ahead of that in the first; and we might draw the broken *dotted* line to show pressures in the *second* cylinder in relation to crank positions. This new line would be of precisely the same shape as the one first drawn, only moved eight crank intervals toward the left.

The advantage of this may be appreciated from the upper diagram of Fig. 5, where we have the *four* superposed curves abcdef, bghifj, gekljm, efnomp, which would be obtained if four cylinders were used. Consider such a crank position as is indicated by the dotted line xy. From one piston we have a forward pressure zv, from another a resisting pressure zy, from the other two no pressure. The net forward pressure for the whole four pistons is zv — zy, a distance which is laid off as ab on the lower diagram. Proceeding in the same way, we obtain the entire lower diagram, representing the relation between aggregate piston pressures and crank positions. There are still periods of resisting pressure, but on the whole there is no forward pressure during about 0.6 the time against 0.25 the time in the case of the single cylinder or 0.5 the time with two cylinders. In the actual engine the case for four cylinders is even better. If we assume that in order to start "on the spark" with cylinders in average condition a charge of gas must be available at not less than half full compression, the odds in favor

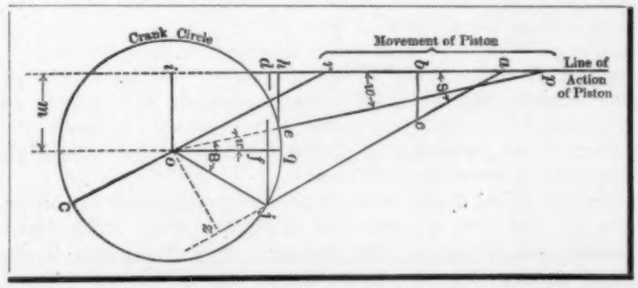


Fig. 9—Diagram of relative connecting rod and crank positions

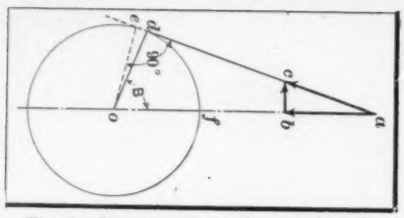


Fig. 7—Diagram of the force acting along connecting rod and upon lever arm of crank

of such starting with the four-cylinder motor appear, from Fig. 5, to be about 1 in 5.

With six cylinders, we have the diagrams of Fig. 6. The net pressure is forward during more than 70 per cent. of the time (from an actual diagram it might be so all of the time) and under the assumption already made the chance of starting on the spark appears to be about 1 in 3. Of course in good operation with a short stop the chances are much better than these figures indicate; but it is probable that they are fairly comparative; i.e., that the "six" will start without cranking about three times, to twice in the case of the four-cylinder machine.

CRANK PRESSURE AND MOMENT.

In all of the diagrams, thus far, ordinates have represented piston pressures; but it is not the piston pressure with which we are practically concerned. What is of immediate importance is the *effort exerted at the crank shaft,* which is described as a *moment,* or product of tangential force directly exerted along the rod (a function of the piston pressure and rod angle) by the perpendicular distance from the shaft center to the line of action of this force. As has already been shown, the piston pressure is occasionally zero, and at such times the force of the moment will also be zero while at the dead center positions of the crank the moment will necessarily be zero since the perpendicular distance (called the "lever-arm") of the moment is at those positions zero.

If in Fig. 7 the length of the line ab represents the piston pressure, that of ac will represent the force acting along the rod, and oe, perpendicular to ae, will represent the lever arm. The movement is then

$$oe \times ac,$$

which may easily be shown to be equal to

$$Pr \sin B \left(1 + \frac{r \cos B}{\sqrt{l^2 - r^2 \sin^2 B}} \right)$$

where l is the length of the rod, and r that of the crank, and B is the angle made by the crank od with the center line of the mechanism.

By applying this formula we might obtain such a diagram as Fig. 8, representing the turning efforts or moments for various positions of the crank. In its general features, such as the occasional zero, negative, maximum and minimum values, this graph is not greatly different from the piston pressure diagram of Fig. 4. Superimposed moment diagrams for various cylinders would appear in Fig. 8 like the dotted lines in Fig. 4.

If the axis of the cylinder does not intersect that of the crank shaft, we have the "offset crank" arrangement suggested in Fig. 9. In these, as in the ordinary engine, the lever arm of the moment or crank effort, and consequently the moment itself, are zero at dead centers, or when the piston pressure is instantaneously fluctuating. The sudden change of pressure does not, therefore, produce any corresponding immediate sudden change in moment. This is evidenced by the moment diagram, Fig. 8, on which there are no vertical lines.

For other than the dead-center positions of the crank the offsetting principle permits of one advantage. The lever arms of the moments, and the direct pressures along the rods, may be so adjusted by a proper angularity of offset as to minimize the effect of the negative area (below the horizontal lines in Figs. 4 and 8) in obstructing rotation.

In Fig. 9, eqj is the crank circle, and pr represents the piston travel. The lines n c, through o, and pe, which, if produced would pass through o, then represent the rod positions at the dead centers. For any piston position a, with a radius equal to rc or pe, lay off aj intersecting eqj. Then j is the corresponding crank position. Let the angle of advance of the crank from its upper dead center position (angle eoj) be called B, and let the angle made by the rod with the axis of the cylinder, at the upper dead center (angle eph) be called w. Let the corresponding angle of the rod for any piston position be S. If we draw oq vertically, then

$$\text{angle } qoe = \text{angle } eph = w.$$

Lay off ab representing the piston pressure when the piston is at a, and draw bc horizontally. Then bc and ac are components of the piston pressure, the former producing friction at the piston pin and the latter being the force exerted directly along the rod. Then

$$\frac{ac}{ab} = \frac{aj}{ad} = \frac{1}{\cos S},$$

$$\frac{dj}{aj} = \frac{dj}{l} = \sin S = \frac{df + fj}{l} = \frac{m + fj}{l},$$

where l is the length of the rod and m is the linear offset of the crank = io. But

$$\frac{fj}{jo} = \sin (B - w), \qquad \frac{oi}{op} = \sin w = \frac{m}{l + r},$$

r being the crank radius. Also,

$$\begin{aligned} og = \text{lever arm} &= oj \cos jog = r \cos jog = r \cos (90 - ojg) \\ &= r \cos [90 - (180 - fjo - fja)] \\ &= r \cos [-90 +)90 - (B - w) + 90 - S] \\ &= r \cos (90 - B + w - S). \end{aligned}$$

By a combination of these relations,

$$\text{Turning moment at } j = ac \times og = \frac{ab}{\cos S} . r \cos (90 - B + w - S),$$

in which B, r and ab are given, w is found from the relation

$$\sin w = \frac{m}{l + r},$$

and sin S is equal to

$$\frac{m + r \sin (B - w)}{l}.$$

The complete expression is, then,

$$\text{Moment } j = \frac{ab}{\sqrt{1 - \left\{ \frac{m + r \sin (B - \sin^{-1} \frac{m}{l+r})}{l} \right\}^2}} \; r \cos \left\{ 90 - B + \sin^{-1} \frac{m}{l+r} - \sin^{-1} \frac{m + r \sin \left(B - \sin^{-1} \frac{m}{l+r} \right)}{l} \right\}$$

from which such a diagram as that of Fig. 8 could be plotted.

The diagrams show maximum stresses on piston, piston rod and pin, connecting rod and crank pin; they give also the data needed for designing crank, shaft and flywheel. Taken in conjunction with the mass of the wheel and rod, they enable us to predict and control speed fluctuation during the revolution.

The need for several cylinders is obvious. The use of the offset crank, while not technically increasing power and not smoothing out variation in turning moment, may give greater uniformity of turning effort with a given number of cylinders.

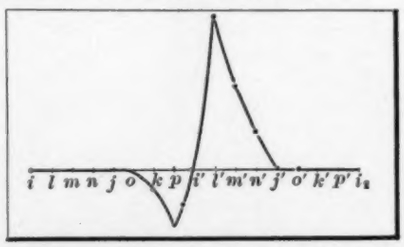


Fig. 8—Variations of turning effort of crank, corresponding to diagram of pressure variations

It Stands to Reason--

THAT the expression of genius, if it makes for good, is the mere echo of intensified cultivation.

THAT the man who applies himself continuously, displaying a fair measure of intelligence, has no rival in the fellow who thinks he knows it all.

THAT the men who are making history are performing silently.

THAT the fellow who talks too loud in meeting does too little in the meantime.

THAT a dull axe is the force behind the man who propounds a scheme.

THAT entangling alliances are as two-edged swords in the hands of the unsophisticated.

THAT the men who deliver the mechanisms of the mediocre are the ones who preach finality of design.

THAT business acumen must sit at the head of the table and handle the yearly model problem with a master hand.

THAT unsold automobiles at the end of a given season cannot serve as a proper foundation for advertising about new models.

THAT there is a difference between a new model and a left-over automobile.

THAT the man who thinks he is fooling somebody else gets introduced to the receiver.

THAT a company that has left-over automobiles does not know how to make a favorable impression.

THAT a favorable impression is not one of the earmarks of an inefficient sales organization.

THAT man who cannot sell automobiles is probably the type of individual to abandon the farm.

THAT competition suggests a contest of giants; there can be no competition between sleepers.

THAT earnestness of purpose is lost sight of by the man who tries to put something over.

THAT the weapon of the successful is earnestness of purpose.

THAT it would be a queer world were bulldogs to have a monopoly of tenacity of purpose.

THAT there is no occasion for letting the claws out from under the velvet just because you happen to have them.

THAT there is no use of denying that you belong to the fish family if you have no claws.

THAT men who get what they go after let their wants be known in the marts of commerce.

THAT no king ever acquired an empire if he asked for it in a sotto voice.

THAT the best display of force is an intelligent presentation.

THAT a *faux pas* comes natural to the designer who spends all of his time trying to find out what the other fellow is doing.

Electric System of Speed Changing

Editor THE AUTOMOBILE:

It strikes me that while I have read a number of accounts in regard to hydraulic transmission systems, I have never come across an electric system, which obviously would have many advantages. Especially do I imagine that great flexibility would have to be counted among its virtues, and a greater number of speeds than in the ordinary, mechanical course could undoubtedly be obtained. Has anything been done to develop such a transmission system, and what were the results of such efforts?

Duvall, Ill. INTERESTED.

Many attempts have been made to evolve a satisfactory electrical transmission system for motor vehicles, but the Thomas, described in the *Motor World*, Glasgow, differs from previous designs in not being purely electrical, but also mechanical.

Some of the advantages claimed for the system are the large proportion of power transmitted direct, and therefore at high efficiency, the number of running speeds (ten), the absence of break in transmission during changing, self-starting, high acceleration, and freedom from noise and shock, with their consequent reduction in wear and tear.

By the aid of the diagram in Fig. 1 some idea may be obtained of the method of working, which is admittedly a little difficult to explain to the man without technical knowledge.

In the first place, there is no flywheel, but the casing (D) takes its place. Within D are two planet pinions (P and P_1) of different diameters, but keyed to the same spindle, which is free to revolve in the end plates of the casing. These planet pinions mesh with two sun pinions (W and W_1), rigidly connected to the concentric shafts (H and K). On the outer shaft (K) is mounted the armature of a dynamo-motor (B B_1), and on the load shaft (H) is mounted the second dynamo-motor (C C_1). These two machines are connected in series, so that there are two paths for power to be transmitted from engine to road wheels—one a direct mechanical path from W along shaft H, and the second electrical through the two machines to shaft H.

If the sun pinion W is larger than W_1, it will be understood that for a certain rotation of the casing the pinion W_1 will tend to turn backwards and W forwards at speeds depending upon their relative resistances. If the speed of the casing is constant, the speed of H must vary with he speed of K, and since the speed of the latter depends upon its resistance, and therefore to the load on machine B B_1, the speed of H can be varied by regulating the power transmitted electrically.

If we have the casing D rotated by the engine at constant speed, we have the following series of operations.

There being no electrical connection between the two machines before starting, W_1 will rotate freely backwards, and W remain stationary. To start current is taken from B B_1 to C C_1, which produces a double effect on the load shaft H. First, the current transmitted to C C_1 exerts a large starting torque on H, and, secondly, the loading of B B_1 with this current decreases the speed of K, and therefore causes W to rotate, producing a very powerful turning effort at the road wheels. As B B_1 has its speed decreased, the vehicle gains speed until K comes practically to rest. If now K is forced to rotate against and in the same direction as the engine, it is evident that H can have its speed still further increased. This is obtained by transmitting power from C C_1 to B B_1, the former now acting as dynamo and the latter as motor. K then increases in speed more rapidly than H, due to the gear ratio, until they reach the same speed, when the coupling (Q) is engaged, and the current drops to zero. The direct drive is then obtained, and the electrical part of the transmission is put entirely out of action.

The reverse is obtained electrically by engaging Q and disengaging S, when the armature of B B_1 is driven direct by the engine. By transmitting current from B B_1 to C C_1, the latter having its field reversed, the vehicle is driven backwards.

The actual variations of speed are obtained by adjusting the strengths of the fields of the two machines, and this and all operations relating to the transmission is controlled by a single lever placed between driver and passenger.

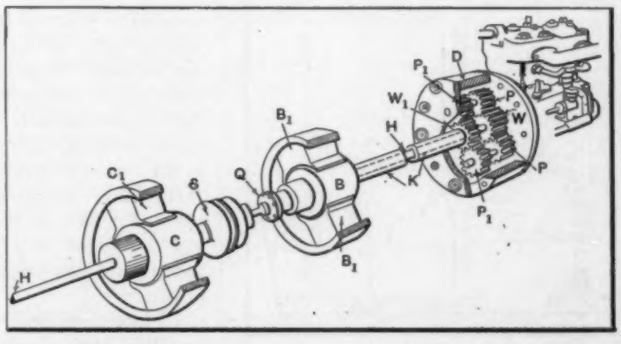


Fig. 1—The Thomas transmission system, which is the electro-mechanical type and affords a selection of ten speeds

How to Make a Fold-Away Seat

Editor THE AUTOMOBILE:

[2,715]—Occasion often arises when I want to carry an extra passenger and would like to have your ideas on some method of fitting extra seats to my car. I am particularly anxious to have something that will fold away when not in use. Could you give me a sketch of such a seat?

ALLAN-A-DALE.

Montpelier, Vt.

A seat that should suit your requirements is shown in Fig. 1, and the appearance when folded into the boot of the front seat is shown in Fig. 3. It can be used in two ways, either as in Fig. 1, facing forward, or with the passengers face to face, as in Fig. 2. An iron frame is made and countersunk in the floorboards of the back of the car and hinged at the bottom with two uprights that form the feet, as the illustration clearly shows. The tops are fitted with hinges to allow the seat to fold in all directions, and the rest on which the seat rests when used facing forward can be made by fitting a bracket in a socket so that when the seat is not in use the rest can be turned inwards towards the upholstery.

We Have Decided to Write the Editorial

Editor THE AUTOMOBILE:

[2,716]—A few weeks ago I read with much interest an article in THE AUTOMOBILE under this caption, "Used Automobiles Confront Dealers," with a sub-heading as follows: "How to Sell Cars for Cash." I was interested as a student of the industry and one who gives thought to problems confronting those identified with the industry. About the same time this article was read I also perused with interest what some writer had to say about the 1912 lines of a certain large manufacturer. To-day I picked up one of the leading national magazines and one can better imagine my surprise than I can express it to see herein, at the first of June, the 1912 models of another manufacturer offered the public.

What can be the matter with the men at the helm of this great and growing industry? Why do they begin to market the 1912 products when a large proportion of 1911 products have not as yet been delivered into purchasers' hands? It cannot be that they are taking a long view of a sales situation, for it seems to me if they did they would reason out that their progressive attitude is virtually making second-hand cars of the late models which all too many dealers have on their salesroom floors and would be highly pleased to market.

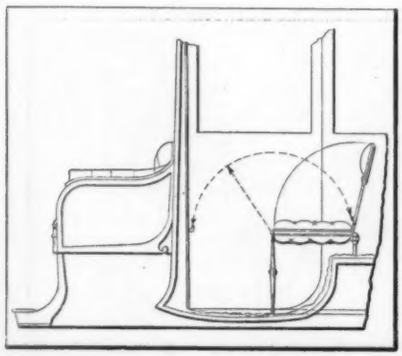


Fig. 1—Showing the spare seat in position and by the dotted lines the method of folding

Haste has never been known to create anything but waste, and in advertising 1912 automobiles before the 1911 product has been distributed is clearly creating friction in the sales organizations of many concerns, and such friction cannot fail to have a deleterious effect on the automobile business as a whole.

One of the most grievous mistakes the trade ever made was to advertise used cars taken in exchange as a 1906 model, a 1908 model, just as if the year of manufacture had the least to do with the car's worth or was a sound foundation upon which to base its present selling value.

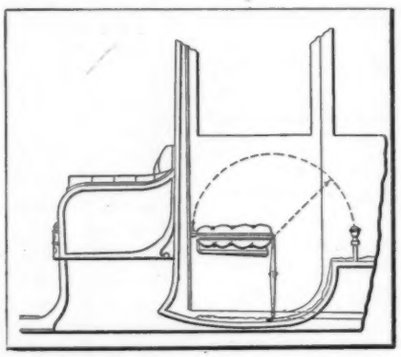


Fig. 2—Showing the seat as it can be used allowing the passengers to face one another

As the public are educated, so are they prone to act, and there is nothing in the world more potent in the business system of education than the persistent use of printer's ink to acquaint people with the facts regarding the products one has for sale. Prosperity follows its judicious use. Loss follows its unjudicious use.

Last year one of the leading manufacturers of cars found himself in difficulties. To move his stock on hand drastic measures were resorted to. The result was instantly felt in an apparently favorable manner to the concern in mind, but the publicity which that business move received reflected detrimentally on every owner of this firm's product who had purchased earlier in the season at catalogue prices. I cite this fact to show that it is the seemingly inconsequential bad moves that affect commercial conditions as a whole, as well as the sociological conditions individually or as a people.

To introduce department store policies of marking new automobiles down to close them out, or to advertise new styles of cars before former styles have become old, is creating barriers to progress in one of the world's greatest industries.

The future of the automobile business rests on the confidence of the public. It can hardly be expected that confidence will be cultivated if the man who puts his money down to-day for a 1911 car picks up a current magazine and finds to-morrow that the firm back of his purchase is out with 1912 models.

Provide a chance for one season's buying and selling enthusiasm to subside before beginning on the next, and the second-hand sales problems, as well as the first-hand sales problems, may reasonably be expected to adjust themselves.

H. D. W. SMITH, JR.

Boston, Mass.

What Some Subscribers Want to Know

The Editor invites owners and drivers of automobiles who are subscribers to THE AUTOMOBILE to communicate their automobile troubles, stating them briefly, on one side of the paper only, giving as clear a diagnosis as possible in each case, and a sketch, even though it may be rough, for the purpose of aiding the Editor to understand the nature of the difficulty. Each letter will be answered in these columns in the order of its receipt. The name and address of the subscriber must be given, as evidence of good faith.

The Clearance Is Not Above Suspicion

Editor THE AUTOMOBILE:

[2,717]—I would like to know the cause of a knock in the rear cylinder of my 4x4 motor (1911 model), which has run only 800 miles. When running slowly, either idle or under load, a rapping sound is heard, occurring at every other revolution of the crankshaft. I have examined the valves, but they are all right. The cylinder has good compression, as have the others. The valve tappets are correctly adjusted and the spark plug fits perfectly.

A SUBSCRIBER.

LaPorte City, Iowa.

It is more than likely that the clearance of the piston in the cylinder complained of is greater than the clearance in the remaining pistons of the motor, which you will be able to prove by measuring all of them, comparing the piston diameters with the bores of the cylinders. The next question is, does the crankshaft whip-saw? It may be that the rear end bearing has let down and that the crankshaft, being unsupported, perhaps, whip-saws at low speed, due to the

What Other Subscribers Have to Say

The Editor invites owners and drivers of automobiles who are subscribers to THE AUTOMOBILE to communicate their personal experiences for publication in these columns for the worthy purpose of aiding brother automobilists who may be in need of just the information that this process will afford. Communications should be brief, on one side of the paper only, and clearly put, including a rough sketch when it is possible to do so, and the name and address of the writer should be given as evidence of good faith.

high torque that is likely to obtain at the lower speeds. Examine the main bearings and see if the crankshaft plays in the rear end bearing. You should be able to observe whether or not the connecting rod bearings have a sufficient side play to save them from interfering.

Fit an Oil Guard

Editor THE AUTOMOBILE:

[2,718]—I recently purchased a second-hand car and there are a few matters I would like to have explained to me. The oil is by some mysterious means thrown up by the flywheel, I think, and covers the underneath of the floorboard, and even comes through the slot for the pedals. How can I stop this? When the car is running on high speed there is a rattling of the shaft between the gear box and the rear axle. This did not happen when I bought the car, but seems to have developed since.

ANNOYED.

Buffalo, N. Y.

For the oil slinging, if you fit a guard similar to the one shown in Fig. 4 the trouble you complain about will disappear. The oil may find its way, however, on the leather if such a clutch is used. There is no reason for there being any oil thrown up in the manner you indicate, and perhaps a paper and shellac joint might cure your trouble. Your propeller shaft noise seems to come from a loose-fitting universal joint, and needs either new blocks or bushes. This may have been temporarily silenced by copious packing with thick grease.

The Makers Should Be Able to Answer This Question

Editor THE AUTOMOBILE:

[2,719]—Will you kindly tell me what companies manufacture the transmission gears for the E-M-F and the Oakland?

Spring Hill, Ia. L. H.

Peter Smith Fletcher Is Lost

Editor THE AUTOMOBILE:

[2,720]—Having your motor paper weekly, which comes direct to our works, I wish to ask a favor of you. I have for some time been trying to find a certain Peter Smith Fletcher (who is an uncle of mine), but, of course, only through your American newspapers. His works when last I heard from him were the "Buchanum Hardware Rolling Mills." His name on paper of this firm was President Fletcher, but I have reason to believe he is now in the motor industry. I am the son of his youngest brother, whose name is Adolphus Cotterill Fletcher.

You would do me a favor if you would insert in one of your columns that I am inquiring for him, and if I can locate him it will be to our mutual advantage. He has been in America for the last thirty years. His age would be about 72 years.

If you should be fortunate enough to find him would you please send him my private address.

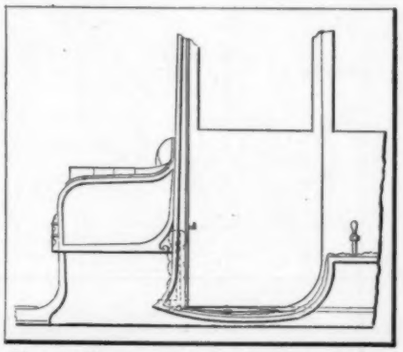


Fig. 3—Showing the seat folded away in the boot without interfering with the entrance to the rear seats

I trust your paper is still meeting with the success it deserves.

ALBERT EDWARD FLETCHER.

Birmingham, England.

Rotative Members Are Not in Good Alignment

Editor THE AUTOMOBILE:

[2,721]—I have been troubled lately by a very bad rattle in either the magneto shaft or the magneto itself. It occurs when the car is standing still, and the engine is running with the spark about half advanced, but stops if the spark is retarded. It also occurs when the car is running down grade and the engine is running free. I have examined the shafting, which seems O. K. Do you think if the timing of the magneto was wrong the noise would occur? The engine seems to be running all right.

Gaithersburg, Md. D. B. DIAMOND.

We are inclined to the opinion that there is lack of good alignment of the rotative members, and that a good deal of the noise will disappear after the magneto is lined up properly. If there is any looseness in the joints we can think of no better way of removing it than to coat over the joint surfaces, using "Solderall," which is a type of self-fluxing solder that can be had at any supply store. This solder melts at a very low temperature and will adhere to iron as well as other surfaces without giving you the trouble of either cleaning or brightening the surfaces to which the solder is to be applied. There are two reasons why this treatment might be efficacious, the first of which includes the idea of reducing the clearance between the joining members, and the second thought is founded on the fact that when surfaces are coated over with solder the noise that the members emit is considerably diminished and dulled.

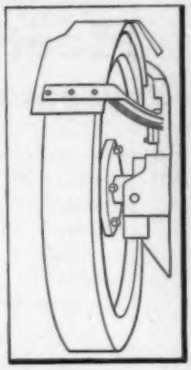


Fig. 4—Guard to prevent oil slinging by the flywheel

How to Protect Terminals from Vibration and Corrosion

Editor THE AUTOMOBILE:

[2,722]—I have seen it somewhere stated that the terminals can be protected with rubber tubing. How is this accomplished, as it would be of great utility to me to be able to overcome this fault? T. W. L.

Elizabeth, N. J.

One method is to obtain some rubber tubing of good quality very slightly larger in diameter (inside) than the wire over which it is proposed to be used, and the manner of fixing is shown in Fig. 5. It will act as a lock to the terminals besides protecting them from dirt and short-circuiting through coming in contact with other metal parts. It is no uncommon occurrence to find that inexperienced people put their batteries in the same box as the tools, and they are surprised to find that a battery has run down after very little use, and blame the battery for what in reality is their stupidity. It is a good deal easier to replace a small piece of rubber tubing than a length of insulated wire.

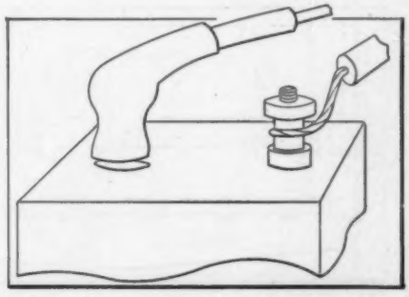


Fig. 5—Showing method of protecting terminals from vibration and corrosion

Meeting Recurring Troubles

Presenting a Series of the Most Probable Cases

A series of correlated short stories, accompanied by diagrams and characteristic illustrations, including the nature of the troubles that are most likely to happen to automobiles, discussing their causes and effects, all for the purpose of arriving at a remedy. It is the aim, for the most part, to show how these troubles may be permanently remedied, and as a secondary enterprise it is indicated how the automobilist can make a temporary repair, thereby enabling him to defer the making of a permanent repair until a convenient time arrives.

CONTINUING the effort to give information to automobilists on the subject of lubrication, as this problem is being solved in the various makes of automobiles, the installment this week illustrates nine methods in vogue in as many makes of cars, showing a certain similarity between them, and yet there is a considerable difference in the execution of the several plans. It is believed that every automobilist should understand the lubricating system in his particular make of car, and that every automobilist will take some pains to arrive at right conclusions, the instant he gets it into his head that the best way to insure an automobile is to assure lubrication. In the various systems the provision for filtering the lubricating oil is carried out in one way or another, but it may not be out of place here to state that acid, on the one hand, or caustic properties on the other, may not be removed from the lubricant by any process shown, so that it remains for the automobilist to put good lubricating oil into the system and to learn how it is circulated, and fed to the various bearings.

OIL CIRCULATION ON ABBOTT-DETROIT CARS.—The Abbott-Detroit engine is oiled by a constant level splash system. The oil is carried in the lower half of the crankcase casting. The oil is put into the reservoir through a filler hole in one of the crankcase supporting arms. A large screw cap covers this opening which, when removed, allows the oil to flow directly down into the lower recess of the oil reservoir.

There are two test cocks on this reservoir; one directly above the other, which serve as a guide in filling and as a test to ascertain the quantity of oil in the chamber at any particular time. In filling the oil tank the top test cock is opened and oil is poured in until there is a flow from this cock. The oil should never, under any circumstances be allowed to run below the level of the lower cock.

From the reservoir the oil is drawn by a plunger pump and forced through a sight feed on the dash, then back to the oil troughs, which are located in the upper part of the crankcase casting.

The pump which keeps the circulation in progress is of the plunger type and is driven by an eccentric off the camshaft. The pump is located on the exhaust side of the crankcase at about the longitudinal center of the motor.

When the oil reaches the crankcase troughs it is picked up by the rapidly revolving end of the connecting rod and thrown up into the cylinders, the connecting rod bearings and those of the camshaft. The main bearings are pocketed also to receive the oil which is fed to them by means of the splash.

The oil runs back into the crankcase reservoirs, which are constantly fed by the pump. This gives an over-supply of oil, causing some of the oil to drain back to the overflows into the reservoir below.

The connecting rod is not supplied with a scoop spoon, but in place of that has an opening in the bottom which is dipped at each revolution into the oil, thus lubricating the crankpin.

The other bearings are supplied with oil or grease cups and the transmission and differential housings are packed in oil and grease according to the standard custom.

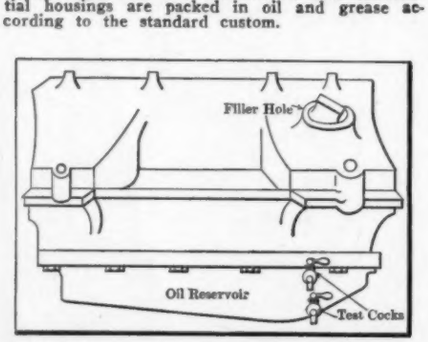


Fig. 1—Crankcase in Abbott-Detroit system, showing filler hole and test cocks

PIERCE-ARROW HAS MECHANICAL SYSTEM.—The Pierce-Arrow six-cylinder engine is lubricated by a mechanical force-feed system. The oil is carried in a copper tank on the top of the exhaust side, which has a sloping bottom providing an oil recess deep enough to cover the leads no matter at what slope the car is running. From the rear end of the tank a pipe is led back to the dashboard supporting a level gauge, which should be kept about half full but never below 2 inches above the bottom of the glass.

The oil is put into the tank at the top by removing a screw cap, inside of which there is a strainer. The oil runs down through eight leads, one of which goes to the timing gears. This is the foremost lead. It feeds the oil through an an opening in the gearcase, allowing it to flow on to the top of the wheel from which point it is carried to all parts of the gearing, finally draining to the bottom of the crankcase.

The other seven leads run directly to the main bearings and lubricate these copiously. The oil

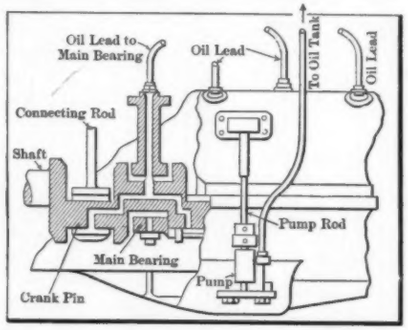


Fig. 2—Mechanical force-feed system of the Pierce-Arrow, with pump in lower crankcase and connection to copper oil tank

then passes through the hollow crankshaft, then through a similar core in the crank and by means of another hole drilled through the crankpin to the connecting rod bearing. A considerable excess of oil is supplied giving a rapid flow through the system.

Since the cylinder is lubricated by the oil thrown from the connecting rod, everything has been done to give the oil a very clear passage through the system; especially in the case of the main bearing which is grooved for one-half of its circumference. Special stress is laid on making the system a flowing but not a dropping system. This is helped by the head of oil due to the height of the tank, which is placed at the highest possible point. A baffle plate is placed in the bottom of the cylinder to safeguard against too much oil when running the car at very high speeds.

All the excess oil is drained to the lowest part of the crankcase. An oil well is located here at a generous depth below the rest of the casting, thereby giving quick drainage to the system.

From the oil well a small gear pump, driven from the exhaust camshaft, lifts the oil through a fine wire gauze strainer back to the tank.

The oil should be replaced after every 250 miles on the average; however, before refilling the oil tank, flush it out well with kerosene oil.

There are two grease cups on the water pump and one on the commutator shaft which should be screwed down occasionally by the operator. The transmission and differentials are packed in grease and oil.

DETAILS OF CHALMERS "30" LUBRICATION—The four-cylinder, 30-horsepower Chalmers car is lubricated by the splash system, the oil being carried at a constant level.

The oil reservoir is part of the lower half of the crankcase casting. It is located beneath the rear end of the casting and extends a little more than half the length of the casting, tapering in depth gradually toward the front of the car. The capacity of this tank is about one gallon. It is filled through the breather pipe; the proper level of the oil being determined by means of two test cocks located on the same side of the engine as the breather pipe. The upper test cock is left open when filling the reservoir and oil is poured in until there is a flow from this cock. The second test cock is placed at a level which is a minimum at which the motor should be operated.

The oil is drawn from the reservoir by means of a plunger pump. This pump is placed horizontally and is located on the left side of the crankcase near the rear end. It is operated by the same cam which operates the inlet valve on the cylinder. The oil is forced through the sight feed which is of the bull's-eye type and is located on the dashboard in plain view of the operator. When the oil is flowing properly the sight feed will be completely filled with oil and the white back will be invisible; should, however, the system fail to work satisfactorily the white bull's eye will become visible at once.

After flowing through the sight feed the oil is

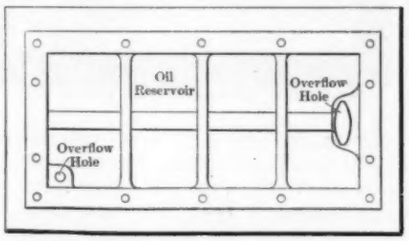


Fig. 3—Horizontal section of Chalmers base-chamber with troughs and overflow holes for connecting rod lubrication

led back to the crankcase and supplied to four troughs located in a sort of inner bottom of the lower half of the crankcase casting. These troughs are constantly kept full and in fact oversupplied; the overflow draining through holes especially made for this purpose.

There is one of these troughs for each cylinder. The connecting rods dip into the pool of oil in the bottom of the crankcase and splash the oil all over the cylinder walls up over the wrist pin into the connecting rod bearings as well as the main and camshaft bearings. At increased speeds more oil is beaten up into the cylinders automatically, thereby necessitating a good supply of oil being kept in the reservoir when traveling under heavy load, as in hilly country or in speeding.

After about every 1,000 miles the oil should be thoroughly drained out by opening the plug at the rear end of the intake side of the reservoir. The tank should be flushed out and the strainer which is located in the plug, thoroughly cleaned.

Other bearings are lubricated by means of oil holes, oil cups and grease cups. The differential housing is packed with two-thirds grease and one-third motor oil. The transmission case is filled with oil.

LANCIA COMBINATION OILING SYSTEM—The Lancia car is lubricated by a force-feed system in conjunction with a splash for the cylinder wall lubrication. The oil reservoir is in the base casting of the engine and has a capacity of about seven quarts. It has a sloping bottom, giving a greater depth to the tank at the fly-wheel end.

The oil reservoir is filled through an opening in one of the supporting arms of the crankcase. The filler hole contains a wire gauze strainer. Oil is poured into the filler hole until there is a flow from a test cock located at the correct level.

There is a compartment in the engine base into which oil may flow by means of a channel. Situated in this compartment is a gauze strainer, through which all the oil is drawn through the force-feed system must pass. At the upper extremity of the compartment there is an opening for the pipe leading directly to the upper side of the pump casing, allowing the oil to be forced down through the bottom of the pump into a tube which leads to a pipe running longitudinally the length of the engine. This pipe is tapped for leads into

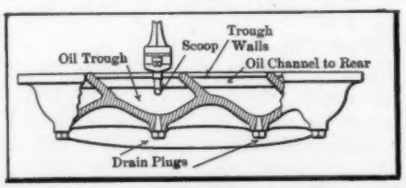


Fig. 4—Troughs used in Cole "30" cars for circulation of oil, the splash system furnishing the necessary cylinder lubrication

each one of the main bearings. The oil passes through the leads into the main bearing casings, and from there through holes in the crankshaft into the center of the crankshaft itself, and thence up into the crankpin. From here the oil finds its way through a small hole into the lower connecting rod bearing. Directly opposite the openings in the crankpins are long straight tubes, through which oil will find its way to the oscillating wristpin bearing.

The oil pump is gear-driven directly off the camshaft, and drives the oil with sufficient pressure to overcome the slight centrifugal force at the point where the oil first enters the crankshaft at the main bearings; from here on the rapidly revolving crankshaft furnishes the circulating force.

Enough oil is supplied to allow of a spray being thrown off the connecting rod, thus lubricating the cylinder walls. A pressure gauge is located on the dash showing the pressure in the oil pump and at the same time serving as an indicator of the manner of operation of the system. The

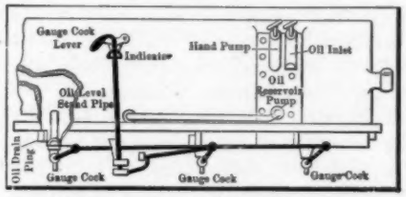


Fig. 5—Complete view of self-contained system used on Peerless cars, showing hand pump to fill compartments of reservoir to right height

base is drained by means of a drain plug in the bottom of the crankcase. Other bearings are equipped with grease cups while the transmission and differentials are packed in oil and grease.

There is a safety valve connecting with a by-pass, through which oil is allowed to pass in case the pressure on the oil pump should mount too high.

THE COLE "30" LUBRICATING SCHEME—The Cole "30" motor is lubricated by the splash system. The oil tank is cast into the forward part of the crankcase and is supplied with a filler opening at the top near the front end. The oil is drawn from the reservoir by a pump that is bolted on to the side of the reservoir and serving as a cover to the inlet opening to the pump from the tank. Below the opening into the pump there is a cup-shaped space into which the oil flows directly and from which it is removed on the up-stroke of the pump, being deposited in the barrel of the pump. On the down-stroke of the pump the oil is forced up through a pipe to the sight feed. The oil enters at the top and after passing the glass comes out of the bottom and passes through a tube along the side of the motor until it reaches the center, passing into the crankcase.

There the oil is continually kept in circulation by means of troughs consisting primarily of two systems, *i.e.*, those which drain the oil forward and those which drain it back. The former are three sloping channels on the sides of the splash chamber walls. The oil is thrown by the connecting rod up into each of these channels and drains through them into the next compartment forward. In the foremost chamber there is no sloping trough, but there is an opening into the long straight channel on each side of the oil pan, which leads back to the rearmost compartment, from where the oil is drained again by means of the sloping troughs in a forward direction, thus keeping up a constant circulation.

The walls which divide the oil pan into four splash chambers are so shaped that if the car is tilted they will form a cup, thus retaining an equal supply of oil as they would if the car were running level.

The oil as it is used is replenished from the tank by means of a pump. The pump is operated by means of a worm on the crankshaft, giving a motion of one turn of the pump driving shaft to twenty-five turns of the camshaft, the length of the stroke of the pump being governed by a set screw provided with a lock nut.

The other bearings on the car are lubricated by grease cups, the differentials and transmission being packed in grease.

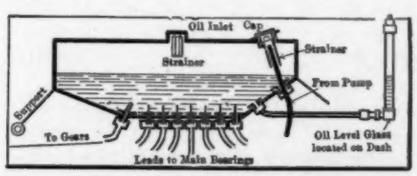


Fig. 6—Oil reservoir in use on Pierce-Arrow machines, showing strainer over inlet from pump, leads to bearings and sight feed on dash

SELF-CONTAINED SYSTEM OF THE PEERLESS.—The Peerless six-cylinder car is lubricated by a system which is almost entirely self-enclosed. The oil reservoir is located on the exhaust side of the motor utilizing to some extent the heat of the exhaust to increase the fluidity of the oil; especially in cool weather. This gives the oil better working qualities and an easier flow through the sight feeds.

The reservoir forms a part of the crankcase casting and has a capacity of somewhat over a gallon of oil. A handpump runs down into the reservoir by means of which each compartment of the crankcase may be filled to its proper level, by turning the handle of the pump until the arrow on the handle registers correctly with the indicator dial. The pump is then worked by hand. The dial plate has a mark corresponding to each compartment and another to which the arrow is turned when the pump is not in use.

The crankcase compartments are filled to their proper level and the reservoir completely filled before starting. In order to know when the oil has reached its proper level in the crankcase a standpipe is placed in each compartment into which the oil will flow whenever it has gone above the level of this standpipe. Each standpipe leads to a pet cock at the bottom of the engine base, which is opened by rods and levers arranged to open all three pet cocks simultaneously.

If oil flows continuously from these pet cocks it is an indication that there is too much oil in that crankcase compartment to which the pet cock is attached. A little flow, however, may be due to oil which has been splashed up into the standpipe by the connecting rod.

After the crankcase compartments have been pumped full the oil is distributed by the splash system. The connecting rod end dips into the oil so deeply that the oil is tossed by the throw of the crank up into the cylinder, lubricating the cylinder, camshaft bearings, cams, wrist pin and main bearings. These latter are pocketed to catch an adequate supply of oil from the connecting rod splash.

The oil is constantly replenished in the crankcase compartments by a pump driven off the camshaft and located within the base casting. This pump forces the oil through three sight feeds to the crankcase compartments. There is a long groove in the bottom plate of each crankcase compartment, which is plugged at each end.

The oil is put into the reservoir by means of an opening next to the hand pump on the side

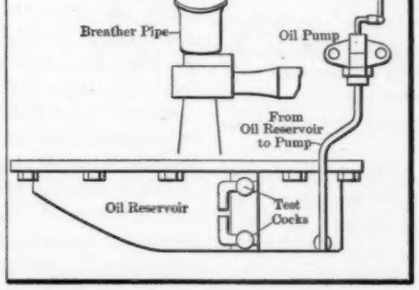


Fig. 7—Filler cap, test cocks and oil pump installed on Chalmers "30," showing shape of reservoir and lead to dashboard sight feed

of the crankcase. The crankcase should be first filled until the oil flows from the drains; the pet cocks are then closed and the reservoir filled.

The transmission is packed in paraffine oil and grease as are also the differentials, wheels and universal joints.

SPLASH LUBRICATION EXCLUSIVELY ON REGAL—The Regal four-cylinder car is oiled entirely by the splash system so far as the engine proper is concerned.

The oil reservoir forms an integral part of the crankcase casting, being completely inclosed. Above the level of the reservoir and separated from it by a partition forming the bottom of the true crankcase are the series of oil wells for the splash. The partitions are of a certain height corresponding to the correct level of the oil, so that when too much oil is supplied an overflow of oil takes place, which finds its way back to the reservoir by means of drains.

The oil is pumped from the reservoir up into the several troughs in the crankcase, where it is picked up by the connecting rod, sprayed and thrown up into the cylinder, at the same time lubricating the main bearings, cylinder, connecting rod bearings, and camshaft bearings.

The oil drains off these bearings and flows back with all other oil which has not been lost or burned up, to the oil reservoir from where it is again pumped through the system.

The pump which circulates the oil is located just forward of the flywheel. It is driven from

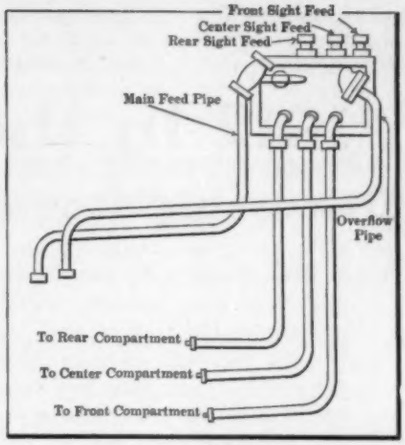


Fig. 8—Oil piping system on Peerless cars, by which each compartment of the crankcase, and thus each cylinder, is supplied with proper amount of oil

the camshaft by means of a bevel gear. Its office is merely to lift the oil from the base reservoir up into the troughs for the splash system. A level glass is located on the right side of the crankcase by means of which the amount of oil in the reservoir may be determined. The reservoir is filled through the breather pipe on the same side of the motor as the level glass. On all the other bearings there are oil holes or grease cups. The transmission is packed in Albany grease and medium oil, as are also the differentials.

There is a drain plug in the bottom of the crankcase by means of which the oil may be drained out and replenished as necessary.

LUBRICATION ON BUICK AUTOMOBILES—The Buick motor is lubricated by an automatic constant level splash system. The oil reservoir is located in the base, which is cast with a double bottom. The upper bottom provides the oil troughs, into which the connecting rod dips, and the lower bottom holds the oil supply.

The upper bottom is cored so as to provide holes for any overflow taking place, due to the oil level having risen above a certain height governed by the sides of the splash troughs. These walls are just high enough to allow the oil to be splashed by the bottom of the connecting rod at the lowest part of the stroke.

The oil is kept in constant circulation by means of a pump, which takes the oil from the bottom of the crankcase casting, sending it through a sight-feed on the dash, into a tube leading along the side of the crankcase. This tube has a lead into each of the splash troughs, thus feeding a large enough supply of oil to keep the oil troughs constantly overflowing into the overflow holes back into the oil reservoir in the base.

The pump is of the gear type, and located on the same side of the motor as the camshaft.

The oil tank in the base casting of the motor is filled through the breather tube stand-pipes on the left-hand side. Oil is poured in until it starts to overflow from the test cock on the left-hand side of the crankcase.

When the oil in the reservoir is at the correct level and the engine in motion the connecting rod will beat the oil into a heavy spray. The main bearings are lubricated by means of a small tube attached to the bottom of the connecting rod. This tube conducts the oil directly to the main bearings. The camshaft and magneto gears are enclosed and run in oil.

The transmission is packed in grease to about four inches from the top, as are the differentials. Grease cups are on the other bearings, while the fan shaft is provided with an oil cup.

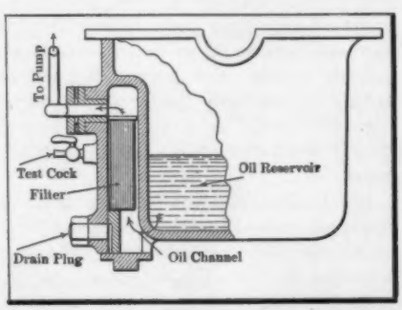


Fig. 9—Lancia cars have a system combining force-feed with splash features, a pump insuring continuous and efficient circulation of the oil

1912 in the Finishing Department

Discussing Ramifications of the Better Class of Work

M. C. Hillick takes up the latest and most improved phases of body-finishing work, telling of the 1912 promise in the face of past experience, and indicating the methods in vogue for obtaining the most favorable appearance initially, and the prolonging of the same for the greatest possible length of time.

IT is not necessary to soar on the wings of the morning to catch an impression of what the painting and finishing of the automobile for 1912 will be. The early announcement of 1912 models, together with sample colors which the enterprising manufacturers are submitting to public attention, serve to show the sure drift of fashion or style and to prove, likewise, that color standards, if such standards actually exist, are sufficiently flexible to keep the automobile buying public in a speculative mood.

The first matter that must be reckoned with in connection with painting and finishing the 1912 automobile is that of speed, for it is already evident that next spring the automobile user and buyer will, if anything, be in greater haste than ever before to get his car into action. Durability, refinement of appearance, together with a thousand or more little details of fine work, so essential to the connoisseur, will be lost sight of in the hurry to get the car into use. This, of course, is not to declare that the graces which invest the finish of the car and make it a work of art in the sight of men are to be ignored or omitted altogether. In the hurry to get the car into service, to work it out on the first stretch of good road that bares itself to the smile of the Springtime, automobile owners and users are sure to sacrifice many splendid features of the finish of their cars and repent at their leisure.

About the first feature to attract attention to the 1912 car will be the color or colors. No radical departure from the colors used this year may be expected. The same elegant browns, the dark aristocratic greens, the blues of manifold charms, and the lakes which speak of royalty, will hold the major share of attention this year as they did last.

Among the new colors for general use, and not given the distinction of individual house or builders' colors, Roman green, light, medium and deep, must be reckoned with as a color of compelling attraction. In Boston blue, a new member of the famous family, the trade has a color of rare tone and brilliancy which car owners of exclusive taste are certain to be pleased with. This lovely blue, and its no less beautiful cousin, Roman green, if striped with 1-16-inch lines of medium gold, and distance lined with hair lines of ivory black, will shine under an increased color effect of exceeding good looks. Browns will be found to have increased in popularity, as, indeed, they have been so found this present season, and among the numerous fashionable shades leather brown will figure prominently. All browns show becomingly under gold and black striping, or under lighter or deeper shades of brown, as measured by the depth of the field color.

In lakes, phenomenal carmine, light, medium and deep, will undoubtedly appeal to fashionable car people who like a good bit of vivid color overcast with real brilliancy. Carmine—all lakes, as a matter of fact—display a quiet charm when striped with black lines of varying widths.

Along with battleship gray, elephant gray will divide the honors in this field next year. In truth, it may be said to be claiming a share of the honors this season, as it deserves to, for it is unmistakably a gray of handsome shade. The gray fields take most kindly to gold and black striping effects, and during 1912 some of the most effective ornamental work on gray cars will be done in gold and black.

However much the haste with which the 1912 car is to be painted, the surfacing work must be about as thoroughgoing as it has hitherto been, for in the ultimate estimate the best surfaced car is certain to win the recognition worth having.

The metal car will get through the paint shop quicker than the wooden body car, for the very logical reason that the heating room, or drying room, as it is variously called, is being installed in many plants, and in these apartments, heated all the way from 125 to 175 degrees Fahrenheit, the metal body, after receiving a coat of paint, or color, or varnish, is consigned until said coat is sufficiently dry to receive another coat, the practice going along until the body is finished and ready for shipment or service. With this heating device the car may in three days be painted and finished from the naked surface. Two coats of rubbing varnish may thus be put on in one day, both coats rubbed with water and pumice stone, and a coat of finishing varnish applied. This forced system of drying will enable the painter to handle cars more promptly, and while it is a fairly radical change as compared to the practice in vogue for a generation, or, to put it more precisely, for all time previously, it is destined to find acceptance by reason of its capacity to fairly paint and finish the car while the owner is enjoying his dinner. Concerning the durability of this forced drying system little is, perhaps, known at this time, but in the matter of the finish—its high and sharp luster and all the splendor which a good varnish imparts—there is nothing to warrant criticism.

Even without the drying room or the baking oven, the automobile is to be, and is being to-day, painted and finished in a speedier fashion than formerly. Quick drying crash and surface fillers, facing up pigments, leveling mediums—practically everything, in a word, that enters into the paint and varnish fabric, contribute to the quick results which the painter is getting, and which the great and generous public is demanding and is bent on demanding, during the years to be.

Is Carbureter Too Small?

Simple test which any automobilist can make if he desires to discover whether the carbureter with which his car is equipped is sufficiently large to carry the car up the long, steep grades liable to be met with in a tour over an extent of country.

THE best test to make to ascertain whether or not the carbureter is large enough for a motor in a specific instance is to take the automobile to a road that has a 20 per cent. grade that is long. Start the car up the grade at its maximum speed and slide to low gear, keeping the motor going as fast as possible and the car climbing as fast as it will go. If the carbureter is too small for the motor, the latter will drink up all the gasoline that the carbureter will supply, and, as the demand will then exceed the supply, the motor will then stall.

This is a dangerous situation and it is one that should be examined into by every autoist in order that he may be able to judge of the mountain climbing ability of his automobile before he entertains the idea of starting on a tour through a country where his car will be called upon to make steep ascents.

Placing the Muffler

Designers should see to it that the muffler is not so placed that lubricating oil can come into contact with it, for the result will mean a fracture of the anti-smoke ordinance. Neither should the exhaust pipe point downward toward the road, giving ground for indictment as a dust nuisance. Muffler cut-outs serve no purpose other than to tickle the vanity of the pin-headed chauffeur who glories in the attention attracted to him by the racket.

WHEN it is remembered that mufflers are heated to a point sufficiently high to vaporize lubricating oil, it is evident that they should not be placed in a position where lubricating oil can get at them, for then they will become a nuisance and serve as the basis for a violation of the smoke ordinances. They should be flexibly mounted, and the piping leading from the motor should be so hung that its weight will not come on the muffler. The exhaust pipe leading from the muffler to the atmosphere should not be pointed down, because the exuding exhaust will then brush against the roadbed, picking up dust, thus becoming the basis of a road nuisance. Noiselessness is only to be consummated if the parts are all in secure relation and free from interference. A muffler cut-out serves no useful purpose whatever. It offers to a chauffeur wide opportunity to annoy the public at large, giving him a means of calling attention to his exalted position, and it is proof of the fact that the motor is not big enough for the work to be done, or that the back pressure of the muffler is greatly in excess of that which is dictated by good designing, unless it is attached as a matter of business expediency, with the idea that it will serve as a selling point, hoping to attract the notice of the budding autoist, who, unfamiliar with the technical situation, absorbs information from whatever source indiscriminately.

Use of the Manograph

The manograph is better adapted to the task of tracing cylinder pressure in a motor than is the indicator, the latter, owing to lost motion and lack of responsiveness of the spring, being unsuited to the high speeds of which the gasoline motor is capable.

LIKE the indicator, the manograph traces the pressures in the cylinder of the motor; but the indicator, on account of inertia of parts, lost motion and the lack of responsiveness of the spring, fails to do accurate work when it is used in high-speed gasoline motor work, and the manograph is used in preference. The reason why the manograph is more suited to the work is due to the fact that a beam of light is utilized photographically to trace the line of pressure, thus eliminating the necessity of using a spring and a stylus or other equivalent as a pencil in a finger-like arrangement. If the volumetric efficiency of a motor is low it is assured that the power will be below the requirement and the thermal result will be poor. In reading the cards taken by a manograph it is necessary to be fairly well acquainted with the characteristics of motors, and, while there is quite a difference between steam practice in this regard as compared with the best practice in internal-combustion motor work, the fact remains that there is a certain need for "horse sense" in both cases.

Calendar of Coming Events

Handy List of Future Competitive Fixtures

Race Meets, Runs, Hill-Climbs, Etc.

July 1.....Ossining, N. Y., Hill Climb, Upper Westchester Auto Club.
July 1.....Baltimore, Md., Hill Climb, Automobile Club of Maryland.
July 3-4.....Brighton Beach, N. Y., Track Races.
July 4.....Mt. Holly (N. J.) Track Races, South Jersey Motor Club.
July 4.....Columbia, S. C., Hill Climb, Automobile Club of Columbia.
July 4.....Kansas City, Mo., Track Races, Automobile Club of Kansas City.
July 4.....St. Louis, Mo., Pleasure Car and Commercial Reliability Run, Missouri Automobile Association.
July 4.....Bakersfield, Cal., Road Race, Kern County Merchants' Association.
July 4.....Pottsville, Pa., Track Races, Schuylkill County Centennial.
July 5-22.....Winnipeg, Man., Fourth Canadian Competition for Agricultural Motors.
July 7.....Taylor, Tex., Track Races, Taylor Auto Club.
July 8 or 15.....Philadelphia, Track Races, Belmont Park, Norristown Auto Club.
July 14.....Philadelphia, Commercial Reliability Run, Quaker City Motor Club.
July 15.....Guttenberg, N. J., Track Races.
July 15-17.....St. Louis, Mo., Reliability Run, Missouri Automobile Assn.
July 17-19.....Cleveland, O., Three-Day Reliability Run of the Cleveland *News*.
July 17-22.....Milwaukee Reliability Run, Wisconsin State Automobile Association.
July 21-22.....Brighton Beach, N. Y., Twenty-four-Hour Race.
July 20-28.....Minneapolis Reliability Run, Minnesota State Automobile Association.
Aug. 1.....Chicago, Ill., Commercial Reliability Run, Chicago *Evening American*.
Aug. 3-5.....Galveston, Tex., Beach Races, Galveston Automobile Club.
Aug. 12.....Philadelphia, Reliability Run, Quaker City Motor Club.
Aug. 12.....Worcester, Mass., Hill Climb, Worcester Automobile Club.
Aug. 17.....St. Louis, Mo., Reliability Run, Missouri Automobile Assn.
Aug. 25-26.....Elgin, Ill., Stock Chassis Road Race, Chicago Motor Club.
Sept. 1.....Chicago, Ill., Commercial Reliability Run, Chicago Motor Club.
Sept. 1.....Oklahoma, Reliability Run, *Daily Oklahoman*.
Sept. 2-4.....Brighton Beach, N. Y., Track Races.
Sept. 2-4.....Indianapolis Speedway, Track Races.
Sept. 4.....Denver, Col., Track Races, Denver Motor Club.
Sept. 7-8.....Philadelphia, Track Races, Philadelphia Auto Trade Association.
Sept. 7-9.....Hamline, Minn., Track Races, Minnesota State Automobile Association.
Sept. 12-13.....Grand Rapids, Mich., Track Races, Michigan State Auto Association.
Sept. 15.....Knoxville, Tenn., Track Races, Appalachian Exposition.
Sept. 16.....Syracuse, N. Y., Track Races, Automobile Club and Dealers.
Sept. .....Denver, Col., Track Races, Denver Motor Club.
Oct. 3-7.....Danbury, Conn., Track Races, Danbury Agricultural Society.
Oct. 7.....Philadelphia, Fairmount Park Road Race, Quaker City Motor Club.
Oct. 9-13.....Chicago, Ill., Thousand-Mile Reliability Run, Chicago Motor Club.
Oct. 16-18.....Harrisburg, Pa., Reliability Run, Motor Club of Harrisburg.
Oct. .....Atlanta, Ga., Track Races, Atlanta Automobile Assn.
Nov. 1.....Waco, Tex., Track Races, Waco Auto Club.
Nov. 2-4.....Philadelphia, Reliability Run, Quaker City Motor Club.
Nov. 7-10.....Los Angeles-Phoenix Road Race, Maricopa Auto Club.
Nov. 9-11.....San Antonio, Tex., Track Races, San Antonio Auto Club.
Nov. 10.....Phoenix, Ariz., Track Races, Maricopa Automobile Club.
Nov. 28-30.....Savannah, Ga., Vanderbilt and Grand Prix Races, Savannah Automobile Club.
Nov. 30.....Los Angeles, Cal., Track Races, Motordrome.
Dec. 25-26.....Los Angeles, Cal., Track Races, Motordrome.

Foreign Fixtures

June 25-July 2.....International Reliability Tour, Danish Automobile Club.
July 4.....Start of the Prince Henry Tour from Hamburg, Germany.
July 9.....Sarthe Circuit, France, Grand Prix of Automobile Club.
July 13-20.....Ostend, Belgium, Speed Trials.
July 21-24.....Boulogne-sur-Mer, Race Meet.
Aug. 6.....Mont Ventoux, France, Hill Climb.
Sept. 2-11.....Roubaix, France, Agricultural Motor Vehicle Show.
Sept. 9.....Bologna, Italy, Grand Prix of Italy.
Sept. 10-20.....Hungarian Small-Car Trials.
Sept. 16.....Russian Touring Car Competition, St. Petersburg to Sebastopol.
Sept. 17.....Semmering, Austria, Hill-Climb.
Sept. 17.....Start of the Annual Trials Under Auspices of *l'Auto*, France.
Oct. 1.....Gaillon, France, Hill-Climb.
Oct. 12-22.....Berlin, International Automobile Exhibition.

THE AUTOMOBILE

Vol. XXIV Thursday, June 29, 1911 No. 26

THE CLASS JOURNAL COMPANY
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ENGLAND:—W. H. Smith & Sons, Ltd., 186 Strand, London, W. C., and all bookstalls and agencies in Great Britain; also in Paris at 248 Rue de Rivoli.
FRANCE:—L. Baudry de Saunier, offices of "Omnia," 20 Rue Duret, Avenue de la Grande Armee, Paris.
GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

MANY well-put letters come to the Editor, deprecating the annual model practice as it seems to obtain in the automobile business, and one of the best presentations in the last batch of communications was from H. D. W. Smith, Jr., which is presented elsewhere in THE AUTOMOBILE. We cannot see our way clear to take issue with the writer of this letter on any of the counts that he makes, unless to point out that the chariot of progress has never faltered since time immemorial, and despite the apparent stability of every art, when a designer brings out a new idea it takes precedence over the old just as a codicil overshadows the status of a will. When a man of some means has a capable lawyer to draw up his will and leaves his wealth to favorite relations, the parties concerned in the transaction are quite sure to be well pleased; but time may bring to the dictator of the will a reason why he should add a codicil, and it may be that an orphan asylum will get the entire horde, to the confusion and dissatisfaction of the relatives in question. It may look like an economic waste to them to see a parcel of property drifting in the direction of an orphan asylum, but the point that we make here is "'tis an ill wind that blows nobody good."

* * *

BUSINESS acumen is all that makes a merchant prince, and it is this peculiar property that dictates the annual model and rests heavily upon the man who pays small heed to its ramifications. The automobile business is no more infested with changing models than any other business. As proof of this fact we have merely to call attention to the changes that were wrought in other industrial arts. The art of making pressed steel, for illustration, had enough merit to supplant the use of castings in every place, from frying pans to bridges, into which pressed steel crept, and the art of making lace destroyed the hand-made products of the Orient and of Ireland. Few citizens will have any difficulty in appreciating the fact that the styles in ladies' headgear change with great rapidity, due to the versatility of designers in this field, and to the fact that the patrons of this industry have a penchant for something new. The automobile business is in the same fix. Thousands of men who are skilled in the automobile art spend from 8 to 16 hours per day thinking along progressive lines, hoping to get something better, and it is too much to expect that all this gray matter is to be expended in vain.

* * *

THOSE who have expressed a thought that the automobile of to-day is the last word along the road called "perfection," are about as near to the facts in the case as a cow is to the moon. Within the next two or three weeks there will be announcements of new types of motors that will revolutionize the automobile industry, and that new models will come from the present wave of motor activity goes without saying. If the new types of motors, eliminating, as they do, the poppet type of valve, deliver the power that is promised for them, the designing problem will have to be overhauled, since, in all fairness, if a motor will deliver 60 horsepower instead of 16, if the torque at low speed is doubled by an improvement wrought, and if the work that must be done by the rotative members in the chassis is altogether more than it ever was before, it is reasonable to infer that there must be new models on the ground that the designs as they obtained in the past will be insufficient for the need. There is a great difference, of course, between saying that a model is new if it is a mere revamp of a previous model, and the taking advantage of the better things that are constantly being evolved as the product of work on the part of thinking men.

* * *

THERE is just one way to get out of the idea of having annual models in automobile work and that is to imprison all of the thinking men who are trying their best, under conditions of keen competition, to improve upon their previous efforts. Referring to the automobile business, we are struck with the idea that it would take stout prison bars to dam up the force that is represented in the brains of the automobile industry, and the probabilities are that the new models will come year after year, or at least from time to time, and the evolution that is constantly going on will be in the direction of the type of automobile transportation that will ultimately supplant the railroad train, as we now understand it, for all short-haul work, with the further chance that any haul under 500 miles, perhaps, will be made over improved roads without steel rails. Since it is not practical to consider imprisoning the brains of the industry, and since it is not feasible to teach men to think, and then to get them to quit thinking, nothing remains but to ask business men to improve on their methods.

"Industry's Good" Settles Glidden

Premier Withdraws Suit and Costs Are Divided

As outlined in previous issues of THE AUTOMOBILE, *the legal dispute over the possession of the Glidden Trophy of* 1910 *has been settled by the withdrawal of the suit entered by the Premier company. The suit has been one of the most troublesome items in the industry and had dragged out so long that any good that might have resulted from its settlement by a decision of the court had been lost. As there was no good purpose to be served by continuing the action and as much trouble was possible, it was determined to stop the action. Costs were apportioned between the parties at issue.*

AFTER litigation that has lasted almost a year, the Glidden Trophy dispute between the Premier Motor Manufacturing Company, the Chalmers Motor Company and the Contest Board has been settled and one of the most annoying questions that has ever arisen in American motordom has been decided, by the withdrawal of the suit filed by the Premier Company.

The welfare of the industry was the prime motive that actuated the Premier company in taking this action, according to legal representatives of the plaintiff. The matter was before Justice Josiah T. Marean of the New York Supreme Court, and after several postponements and adjournments and a partial hering of the facts he entered the order of dismissal on motion of the Premier company, requiring the costs of the action to be borne by each of the parties at issue.

The basis upon which the agreement was founded was the following stipulation:

SUPREME COURT, KINGS COUNTY.—HAROLD O. SMITH, Plaintiff, against THE AMERICAN AUTOMOBILE ASSOCIATION, SAMUEL M. BUTLER, SAMUEL B. STEVENS, DAVID BEECROFT, T. A. WRIGHT, JOSEPH R. WOOD, CHALMERS MOTOR COMPANY AND GEORGE W. DUNHAM, Defendants.

IT IS HEREBY STIPULATED THAT the complaint in the above entitled action be dismissed without costs to either party as against the other and that an order to that effect be entered.

Dated, New York, June 26th, 1911.

GEORGE C. LAY,
Attorney for Plaintiff.
CHARLES THADDEUS TERRY,
Atty. for Defts. American Automobile Assn. and Samuel M. Butler.
JOB. E. HEDGES,
Atty. for Chalmers Motor Company and George W. Dunham.
RUSSEL LORD TARBOX,
Atty. for Defts. Samuel B. Stevens and David Beecroft.

"Upon reading and filing the accompanying consent of the attorneys for all the parties hereto, it is

"ORDERED that the complaint in the above entitled action be, and the same hereby is dismissed, without costs to either party as against the other

"Enter."

Harold O. Smith, president of the plaintiff company, made the following statement:

"In view of the length of time which has elapsed since the conclusion of the Glidden Tour for 1910, no substantial benefit, either to the manufacturers of motor cars in general or to the parties to the litigation, will result from the further prosecution of the pending litigation, but on the other hand the best interests of the automobile industry will be served by a discontinuance of the action at this time. I have, after full consideration of the matter, concluded to dismiss the suit now pending in the Supreme Court in Brooklyn."

On behalf of the Contest Board, Chairman S. M. Butler has issued this statement covering the case from the viewpoint of the defendants:

"A termination has been reached in the suit of H. O. Smith, President of the Premier Motor Manufacturing Company, to set aside the decision of the Contest Board, declaring that the Premier 6-cyl. entry No. 1, in the 1910 Glidden Tour, equipped with auxiliary oil pump and tank for forcing oil direct into the crank case was not a "stock car" under the Rules, and awarding the Glidden Trophy to the Chalmers Motor Company.

"On September 8, 1910, the temporary injunction previously secured on the allegations of H. O. Smith, President of the Premier Motor Manufacturing Company, restraining the Contest Board from delivering the Gliddden Trophy to the Chalmers Motor Company was vacated and dissolved by Mr. Justice Putnam in the Supreme Court of the State of New York and the application to continue such injunction denied.

"On April 5, 1911, the case in equity came up for hearing before Justice Marean in the New York Supreme Court. After hearing the arguments and taking testimoney on April 5, 6 and 7, the Court adjourned the case for sixty days to June 7, the Court instructing H. O. Smith, President of the Premier Motor Manufacturing Company, to furnish to the defendants the name and address of every user or purchaser of a 1910 Premier 6-cyl. touring car whose car left the factory of the Premier Company between the dates of May 4 (the date on which the Premier Company admitted it first began to furnish the oil pump and tank as stock equipment) and June 14, the date of the beginning of the 1910 Glidden Tour; and also the name and address of every dealer who then had any of such 1910 Premier 6-cycle touring cars, turned out of the factory between those dates. The Court further instructed that such information should be furnished to the defendants by May 7, and that H. O. Smith and the defendants should each appoint an impartial commissioner and the two commissioners should take the depositions of these owners and dealers, if any, of 1910 Premier 6-cycle touring cars, for submission to the Court on Jupe 7.

"On June 7, at the request of the plaintiff, further hearing of the case was adjourned to June 19 and on that day it was again adjourned to June 26.

"No depositions were taken, and on June 26 the case was dismissed by the court, leaving the jurisdiction of the Contest Board in this case undisturbed."

Four Shows for New York Motordom

Besides the Madison Square Garden show and that to be conducted by the N. A. A. M. there is a chance that New York will have another big automobile show next January in addition to the projected display of the importers. This will be the effort of the Automobile Manufacturers' Association of America, which has been announced for the first week in January, 1912. It is intended to show both commercial and pleasure cars, as was done last year. C. W. Kelsey, secretary, is authority for the statement.

Preliminary work on the A. B. of T. show is being done, and plans for a display greater even than that of last winter are being formed. The N. A. A. M. plans are being worked out, and altogether the indications are for another new mark in the automobile shows.

The quarterly members' meeting of the Board of Trade and the monthly meeting of the directors will be held some time next week.

Brighton Beach Ready for Big Meeting

Brighton Beach will be the scene of two days of racing on July 3 and 4. The revised entry blanks amending the original conditions to some extent have been issued. The new blanks do not give the right to the promoters to refuse entries without giving reasons for doing so. The Remy brassard will be contested for in three-mile heat races to be run on both days of the meeting. A big field of entries will probably start in several of the class races.

Rochester Branch for Touring Club

Bert Van Tuyle, one of the leading automobile enthusiasts of the Genesee Valley, has been appointed manager of the new branch of the Touring Club of America at Rochester, N. Y. The department will be known as the Genesee Valley branch, quarters for which have been secured in the rooms of the Automobile Club of Rochester, which are situated in the Hotel Seneca in this city.

Mr. Van Tuyle has been identified with automobiling for many years and served as secretary of the Rochester Club for several terms.

Delage Wins Again

Thirty-one cars faced the starter at Boulogne on Sunday to compete for the Coupe des Voiturettes over the fine roads of the thirty and one-third miles circuit. The winner's time was seven hours for 388 miles, averaging slightly over 55 miles per hour.

BOULOGNE-SUR-MER, June 25.—Again the car with a small bore has proved to the world that the days of the extravagant speed monster are numbered. This year's race has been marked by an international touch which has been lacking in previous years. Last year's race resulted in a slightly faster average speed than this by about .45 of a mile per hour, the speed then being 55.7 miles per hour for a 282.4-mile course. The circuit over which the cars sped to-day was 32 1-3 miles and had to be covered twelve times, making a total mileage of 388 miles, over 100 miles longer than last year's.

Bablot on a Delage proved the winner and the car driven by him is shown in Fig. E. No attempt was made on the part of the designers of this car to unduly cut down weight, as was done by some of the other contestants. The minimum weight permissible without driver and mechanician was fixed at 800 kilogrammes (1,763 pounds) and the weight of the Delage was 1,030 kilos (2,270 pounds), equal to the weight of the racing cars of a few years ago, without limitations as to the size of the motor.

The motor of the Delage has four cylinders cast in pairs, with a bore of 80 millimeters (3.14 inches) and a stroke of 149 millimeters (5 7-8 inches), and the car is capable of attaining 73 miles per hour at 2,200 revolutions per minute. The valves are carried horizontally in the head of the cylinders, operated by rocker arms from camshafts on opposite sides of the motor. Two spark plugs are fitted in the head of each cylinder and they are fired synchronously. Reciprocating parts have been made as light as practicable and stamped steel has been used wherever possible. The pistons are made in this way and are only one-half of one millimeter in thickness. The crankshaft has five ball bearing supports and the camshafts are carried in the same manner.

One feature about the water cooling worthy of notice is that it is of the thermo-syphon type, but has no fan air-draft. Little attempt was made to reduce wind resistance, as can be seen in the accompanying illustration. The gasoline and oil tanks are housed under the extension of the hood in front of the driver and with a sufficient capacity to cover the entire 388 miles without stopping for replenishing. It will be seen from Fig. E that the car is fitted with mud guards and spare tires, which was one of the regulations of the race, and was done to eliminate mere racing machines.

E—Bablot, piloting a Delage, was

A—Beautiful scenery on the Boulogne circuit with one of the deceptive turns
B—A sharp left-hand turn on the Boulogne circuit

Thomas Branch to Specialize on Service

The Thomas Motor Company has leased the northeast corner of Broadway and Sixty-fourth Street, from July 1, together with 20,000 square feet of upper floor space in the same building, for a service department, thereby greatly adding to the size of the present quarters.

President Chalfant, in discussing this matter, said: "Our New York branch will discontinue operating a public garage, for that is an entirely separate and distinct part of the automobile business. The time that has been devoted to that end of it in the past will be put into our service department. In our new quarters four passenger and freight elevators connect the various departments and other improvements will assist in giving unusually prompt attention to owners."

Philadelphians Run for Brazier Cup

PHILADELPHIA, June 26.—Leaving the headquarters of the Automobile Club of Philadelphia, Broad and Locust streets, Saturday, at noon, nine cars took part in the annual legal speed limit run of the organization through Philadelphia and vicinity, all told about 60 miles.

The contest was a continuation of the yearly Brazier Cup run, only this year the trophy will be presented by G. W. Fletcher, who captured it last year.

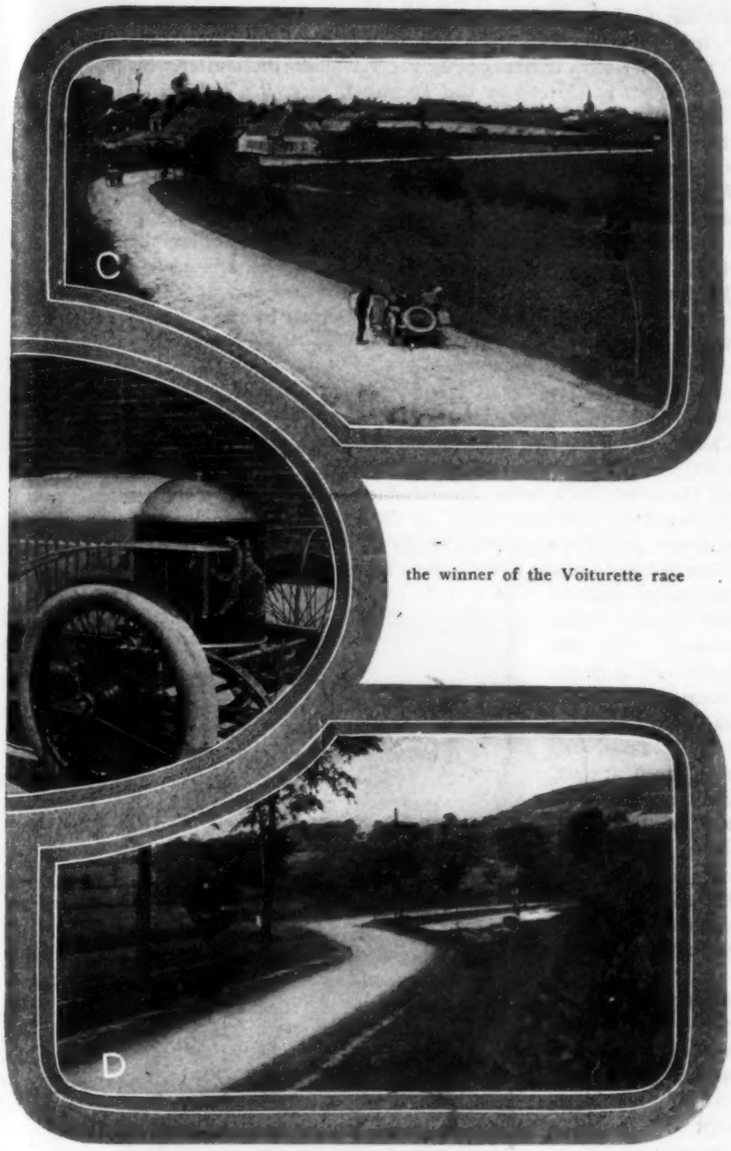
First place was captured by Alan Corson, in a Buick, with a 20-point penalty; second, P. N. Elsasser, Winton; third, G. D. McCreary, Buick.

Entrants took between 3 and 4 hours to complete the run, exclusive of an hour spent at Three Inns for luncheon. Others who participated besides those mentioned above were: J. M. Sailer, Lozier; F. Schaum, Packard; J. J. Dilworth, Marmon; W. S. Harding, Cadillac; C. Wolf, Chalmers; Mrs. H. G Ulman, Stearns.

Maryland Chauffeurs to Be Quizzed

BALTIMORE, MD., June 26.—A bill making it compulsory for chauffeurs to undergo a test before obtaining their licenses is being prepared by the Automobile Club of Maryland to be submitted to the Maryland Legislature.

The club has drafted this bill with the view of minimizing reckless driving.



the winner of the Voiturette race

C—Desves forms one of the turns on the triangular course
D—Stretch at Colembert where caution had to be exercised by the drivers

Sherman Points Out Route Improvement

Vice-President Sherman is an automobile enthusiast, and he goes about it in a way that will appeal to motordom generally. He is one of the most active of the honorary members of the Touring Club of America, and when he goes a-touring he keenly observes road conditions with the idea of augmenting the pleasure of the road to his fellow-motorists.

After a recent trip to Gettysburg, for which the Vice-President used routes set forth in Volume 3 of the Automobile Blue Book, he wrote to the Washington representative of the Touring Club of America calling attention to an improvement in route No. 673.

He relates that the better way to cover this route is to turn left instead of right after passing Etchison at 29.5 miles, and then straight ahead from Damascus. About two miles beyond, on the original route, the right fork goes to Ridgeville, but this left fork goes direct by an excellent country road to Newmarket, six miles west of Ridgeville, where the new route picks up the old and continues into Frederick.

The Vice-President graciously thanks the Washington representative of the club for his pains and care in furnishing him with detailed information as to the route.

Factory News from Detroit

DETROIT, MICH., June 26.—In the opinion of B. C. Spitzley, assistant general manager of the Abbott Motor Co., present indications are extremely favorable and the demand all over the country has wonderfully increased during the past month. He thinks that buyers are becoming more careful, and that nowadays they look cars over mechanically and for the refinements in detail. Talking about new models, he was of opinion that the trade had been hurt in the past by the announcement of yearly models almost before the spring of the current year was started. There will be no radical changes in the next year's models of the Abbott Detroit. The "Thirty" will be continued with some refinements. It is the purpose of this company to bring out a new car for next year larger than the present one with a seven-passenger touring body. It is the intention of the company to continue to make about the same number of cars for next year as this and with the addition of the new model to the line next year's output is estimated at around 3,000 cars.

The prospects of the Warren-Detroit Company, which moved into its new plant some few months ago, are very good, according to J. G. Bayerline, the general manager.

The 1912 car will be the same as the present season in the "30" model. A new model of more power will be added to the selling list. Next year will see an increase in the factory output partly due to the appearance of the new model and partly due to the demand for the "30."

The Paige-Detroit Company is now marketing a small four-cylinder-car selling between $800 and $1,000, with different types of body work. No material change will be made in the car as it was not until late last year that the new model was announced. The demand for the car, according to J. F. Bourquin, was increasing, and the output for the coming season would be materially increased.

S. A. E. Branch to Discuss Costs

In accordance with its program, the Metropolitan Section of the S. A. E. will meet to-night at headquarters. The meeting is the last regularly scheduled until September and an unusually interesting program has been arranged. Two heads will be covered—the first, The Possibility of Accumulating Reliable Data on Automobile Maintenance and Operation Cost, and, second, Types of Fire Extinguishers for Use on Automobiles.

Abbott-Detroit to Tour Pacific Coast

LOS ANGELES, CAL., June 26.—The Abbott-Detroit "Bull-Dog" has arrived in this city and will after a short rest repair to Tia Juania, Mexico, where it will make a 2,000-mile dash up the Pacific coast to Vancouver, British Columbia, on what is known as the International Pathfinding trip of the "Three Nations," as the route lies through Mexico, the United States and Canada.

First Service Departments Installed

The American plant of the Fiat concern at Poughkeepsie has been producing cars now for about nine months, and the American company has established a service corps throughout the country. The experts are stationed at the Fiat branch houses in Boston, Philadelphia, Chicago and Newark, and at the agencies in Pittsburg, Providence, Minnepolis, Kansas City, New Orleans, Los Angeles and San Francisco.

Newark Rivals Open Tour Season

NEWARK, N. J., June 26.—Newark's rival automobile organizations went on their first runs of the season yesterday. The New Jersey Automobile and Motor Club, 50 cars strong, journeyed to the club's country home at Lake Apshawa. About 150 autoists were in the cars on the Newark Motor Club run to Newton. Dinner was served at the Cochran House in the Sussex town.

Metropolitan and Newark divisions of the Premier Ocean-to-Ocean Amateur Tour, leaving Newark for San Francisco via Atlantic City

Premier Fleet Starts Long Cruise

PHILADELPHIA, June 26.—A dozen Premier automobiles taking part in an "ocean to ocean" trip made their initial stop to-day in Philadelphia after an uneventful run from Atlantic City, the starting point, arriving at the Hotel Walton shortly after noon, where they were welcomed by members of the Quaker City Motor Club and the Automobile Club of Philadelphia.

Many Philadelphians are participants in the transcontinental trip, the idea of which originated in this city about three weeks ago. It is proposed to make a run by easy stages from the beach at Atlantic City to Los Angeles, Cal., in 46 days, but as several days will be spent in the various cities through which the tourists will pass, the actual running time will only be about one month. The Motor Tourists, as the party making the trip is designated, comprise Premier car owners exclusively.

After an hour spent at the Walton for luncheon, the motorists started on the next leg of the run, Harrisburg, which city was expected to be reached by 6 o'clock this evening.

Affiliation Run Has Auspicious Start

DETROIT, June 26.—Fifteen automobiles, with virtually all seats filled, left Detroit Thursday morning on the Affiliation Tour of the Wolverine Automobile Club of Detroit, in union with the Cleveland Automobile Club and the Automobile Club of Buffalo. The tourists assembled at Grand Circus Park and were sent away at minute intervals by Starter R. K. Davis, H. H. Robinson, chairman of the Tours and Runs Committee of the club, leading off in the pilot car.

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TOLEDO, June 26.—An event of some importance was the arrival in Toledo Thursday of the 15 cars of the Wolverine Automobile Club, of Detroit, and the eight cars of the Tecumseh Automobile Club, bearing about 75 tourists, who are making an extended "affiliation tour," the first of the kind ever undertaken. At noon they were entertained by the Tecumseh Club, after which they started, reinforced by the Tecumseh cars, for Toledo.

Friday morning they were off for Cleveland, arriving there late in the afternoon after a leisurely and pleasant trip. They were met at Elyria, O., by 15 cars carrying officials and members of the Cleveland Automobile Club, who escorted them direct to the clubrooms, where dinner was served and the evening spent in talking over club and trade matters. Saturday morning they left for Buffalo and Niagara Falls accompanied by a number of Clevelanders. They expect to cross the border at the Falls, thence touring to Toronto and back to Detroit by the Canadian route.

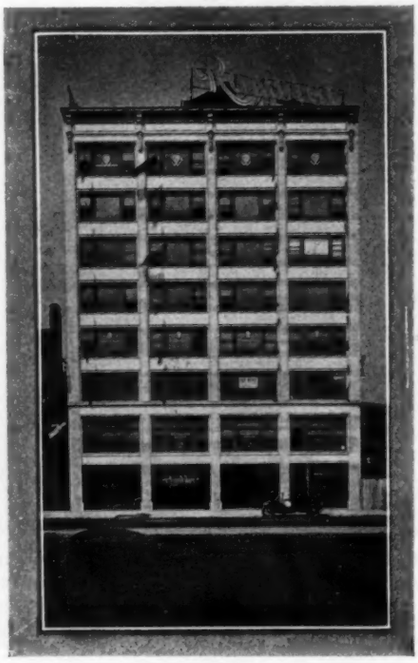
Start of Wolverine Automobile Club Affiliation Run from Detroit

Rambler Takes New Quarters in Chicago

The new Rambler sales headquarters which was opened Monday, June 5, is at 1008 Michigan avenue, between Eldridge and Harmon Court, while the Rambler service department will be located, for the time being, at the former sales and service building, 1462-1464 Michigan avenue.

The first floor of the new building has been remodeled throughout, 10,257 feet of floor space being provided for the display of cars. A system of lighting has been installed so that the cars may be displayed at equal advantage in all parts of the room. There is an auxiliary display room and a ladies' reception room with all accommodations.

On the top of the building will be erected a large single word display electric sign. The word "Rambler," forty-eight feet long, will appear in red electric bulbs, each letter of the word being twenty feet high.



Showing the exterior of the new building occupied by the Rambler Sales Headquarters at 1008 Michigan Avenue, Chicago

The new quarters contain a number of unique features, and in a general way represent a distinct element of advance in the construction of such buildings in the city of Chicago.

Detroit's Blue Law Repealed

DETROIT, JUNE 26.—Two weeks of the "Blue-law" traffic ordinance recently passed by the Council were enough for Detroit. The motorists were up in arms, the police were helpless to enforce the radical provisions of the measure, and the courts faced nearly 2,000 complaints, to hear which would have required night sessions for weeks.

The speed limit is still 12 and 15 miles an hour in and out of the mile circle, respectively. It is no longer necessary, however, for a motorist to bring his car to a full stop before crossing a car track, nor stop before passing a street car taking on or discharging passengers, provided the street is wide enough to allow him to keep his car six feet or more from the street car.

Recent Additions to the Schebler Plant

ACCESSORY manufacturers are a pulse of the motor industry and it is significant to note that the majority of such manufacturers have been pleased with the past year's trading. In order to better cope with an ever-increasing demand the Wheeler & Schebler plant in Indianapolis has been materially enlarged. The foundry has been brought up to date with the most improved forms of appliances and light has been studied to make the foundry as airy as any machine shop. Considerable space that was previously occupied in the actual manufacture of the Schebler carbureters has been given over to the important branch of the work and the new building in the rear of the old one has been fitted out with the latest screw-cutting machinery, making the plant entirely independent of outside labor. Two interesting additions are the dynamometer testing department and a refrigerating room placed side by side. The dynamometer that has just been installed for use in testing carbureters is the product of the Diehl Mfg. Co., of Elizabethport, N. J. The new testing room is shown in Fig. 1. It is a replica of the one used at the Automobile Club of America in New York. It is possible with this apparatus to crank the engine in starting, using the dynamometer as a motor. In this illustration will be seen a motor being tested for power output, and for experimental work the most accurate readings may be obtained, serving as data that could not otherwise be obtained from road tests made on automobiles.

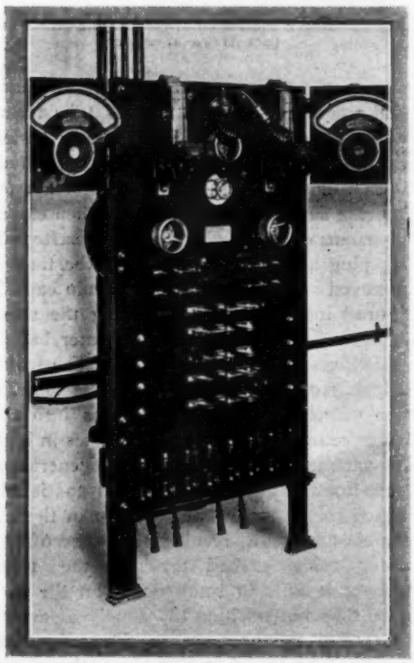


Fig. 2—Switchboard of the dynamometer test-machine at the new Wheeler & Schebler plant

Flexible cables connect the armature and the fields of the dynamometer to the switchboard shown in Fig. 2. The electrical energy developed is dissipated as heat in suitable grids and a water rheostat so arranged that resistance may be cut in and out at will, thus varying the amperes in the armature circuit of the dynamometer with corresponding variations in the load carried by the engine under test.

The refrigerating room will be used for testing cars for a starting and running test under cold weather conditions, it being possible to place a car in the room and by means of a refrigerating motor and suitable piping to reduce the temperature to zero Fahrenheit in from two to three hours on the hottest day in summer.

Mitchell Wins the Semple Cup

ST. LOUIS, June 26.—A pouring rain, amounting at times almost to a cloudburst, served to put difficulties in the way of the fourth annual reliability tour of the Automobile Club of St. Louis. The committee is still out figuring out the official scores. The Fred H. Semple Cup for touring cars was won, however, by C. M. Barnard in a Mitchell car with a score estimated at 996. The

White military ambulance in service at the Seventh Regiment (N. Y. N. G.) camp at Peekskill, N. Y.

S. S. Pingree Cup for roadsters has not yet been awarded.

Twenty-four cars started from the Planters' Hotel, the headquarters of the Automobile Club, at 7 a. m. Saturday. Twenty-one finished. The distance was 138½ miles, skirting the edges of St. Louis, Franklin and Jefferson counties.

E-M-F and Chalmers Entertain

DETROIT, June 26.—Detroit has enjoyed another week of remarkable nature, due to the presence in the city of a record-breaking number of retailers, from all parts of the country. One of the features of the season has been the growing disposition of the factory forces to get into closer touch with the men who dispose of their cars. To this end, a visit of at least once every six months is being encouraged. During June and July each manufacturer's sales department gives up most of its time to the entertainment of these visitors and the strengthening of trade relations with them.

The most noteworthy party was that of Carl H. Page, the Chalmers dealer in New York. Mr. Page brought on his entire force of salesmen and sub-agents from his territory in New Jersey and New England. They came in a special car to attend the annual summer convention of branch managers.

Maker of Monarch Shock Absorber

We wish to correct the statement given on Page 1416 of this paper, to the extent that the Monarch shock absorber there described is not sold by Chas. R. Green, as stated, but that the sale for this device is now in the hands of Wellington P. Kidder, Jamaica Plain, Mass., who is manufacturer and sole agent of that apparatus.

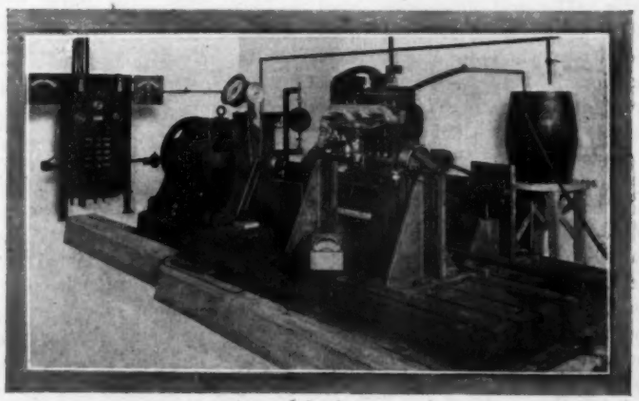


Fig. 1—Dynamometer testing machine installed at the Wheeler & Schebler plant

New Things Among the Accessories

Shain Ballspray Carbureter

THE Shain floatless carbureter, which is seen at Fig. 1, is distinguished by the absence of a needle as well. As the illustrations indicates, the gasoline enters the carbureter through the pipe shown at its lower end, then taking its way through the ten nozzles, which are standard drills, up into the vaporizing space, where the ball is revolved by the suction of the motor and spraying the rising gasoline mixes it with the right amount of air. The latter is supplied through three ports which are threaded for plugs. When the engine stops the ball drops right down on the fuel outlets, closing them as a valve and filling the place of a float used in other types. The ten nozzles screw into the screened plug show at the bottom of the carbureter, and the plug may be removed for cleaning or changing the "adjustment" of the nozzles. The baffle plate has a pin attachment which serves to unseat the ball more or less, the degree of its effect depending on the motor suction and the adjustment of the butterfly. If the ball is lifted higher more nozzles are permitted to step into action, which imparts to the carbureter the properties of the multiple-jet class. The lift of the ball is regulated by means of the thumb nut seen outside at the left, which actuates the eccentric cam located on the shaft placed above the ball valve. This carbureter is manufactured by Chas. D. Shain, 1926 Broadway, New York.

Baker Bolted-On Demountable Rim

ALONG the line of demountable rims, the Baker product, which is seen at Fig. 2, is said to be one of the latest efforts. The first illustration gives an idea of the compactness of this rim, and among the virtues which are claimed for it may be mentioned lightness, simplicity and waterproof qualities. The felloe band of sheet steel is so constructed as to accommodate either a clincher or straight-side tire. The rims, made from standard stock, are split diagonally near the valve stem, the spreader of which bridges the gap. The illustration shows two large studs on each side of the stem, which project into holes of the felloe band, preventing the rim from slipping. A special automatic machine bolt is used for locking, and a sleeve put on the bolt acts as a draw for the wedge when the latter is being removed. A long nut is fastened to the felloe by long rivets, and the sleeve being short, there is enough space around the bolt for hard lubricating grease. The drop-forged wedges fit either type of rim, and the lock plate lies over the valve stem. The illustration shows elliptical holes for the four studs, which arrangement allows a slight gap in the rim to close up when heated and without which the rim would tend to raise off lugs and wedges. Mounting and demounting rims and tires are simple operations, and the splitting of the rim is of especial advantage in that it does away with the disagreeable features of trying to put the tires on a common clincher rim. The Baker Demountable is made by the Weston-Mott Company, Flint, Mich.

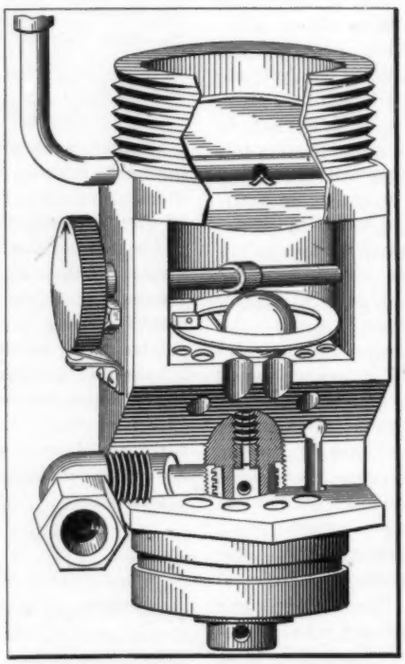


Fig. 1—Phantom view of Ballspray Carbureter, using no needle

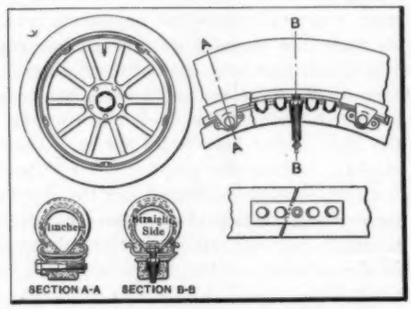


Fig. 2—Baker Bolted-on Demountable Rim and part views of same

Carbo-Light Generator and Tank

TO make one dollar do the work of six, was the incentive stimulating the inventor of the new apparatus turned out by the Carbo-Light Co., of Anderson, Ind., in that it is claimed for this tank that during its operation it costs only one-sixth of the amount otherwise expended in the keeping up of another system of lighting the automobile if acetylene gas is being used for the purpose.

This tank generator, which is illustrated in Fig. 3, takes the place of the acetylene tank generally used on cars. As is seen by the cut, the apparatus consists of two chambers connected by a thin brass tube terminating in the gas compartment in a system of radial tubes. The operation of the tank is as follows: Two quarts of water are put into the small chamber, which is then closed by means of the small plug. Thereafter the big plug at the opposite end of the tank is removed and six pounds of calcium carbide poured into the chamber, filling the small cup attached to the plug with water before screwing same back in position. The water dripping on the carbide starts the generation of acetylene, which streams into the water chamber till the gas pressures in both compartments are equal. Then generation stops for the time being. When gas is admitted to the lamps the pressure in the big chamber falls off, resulting in some of the water being pushed through the tube, whence it falls in small drops on the carbide, thus replenishing the supply of acetylene until the pressure in the generating section is greater than that above the water, when the flow of latter through the tube ceases.

As soon as the excess of pressure has disappeared owing to the call of the lamps on the tank, the flow of water begins again, etc. The gauge at the water end of the apparatus shows the falling level of the liquid so that it may be replaced whenever necessary; and the ashes of the carbide in the generating room do not remain on top of the fuel, but fall to the bottom of the tank, the valuable material always remaining accessible to the water. The tank generator is provided with more than one refinement which promises a regular, automatic and efficient supply of illuminating gas.

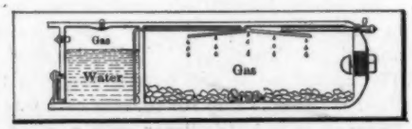


Fig. 3—Sectional view of Carbo-Light Acetylene Generator and Tank

Glenard Mechanical Starter

STARTING the engine by cranking is an operation which has aroused the hatred of many comfort-loving autoists, and consequently every device put on the market and which claims to do away with this botheration is welcomed by numberless car owners and operators. Some of these devices, however, have failed to make

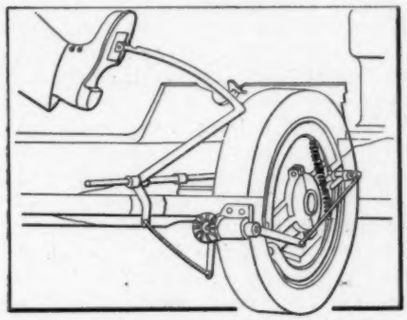


Fig. 4—Glenard engine starter, working on purely mechanical principles

good in actual service. There has been a pronounced demand for a starter working by purely mechanical means, which may be relied upon to work with unfailing certainty. This end seems to have been accomplished by the construction of the Glenard starter, product of the National Motor Device Co., 323 Michigan Avenue, Chicago, Ill., which is seen in Fig. 4, and the simplicity of which is striking. The starter consists of a system of levers, and depressing the pedal fastened to the composite lever twists around the cross shaft to which it is attached, which in turn twists a second lever downward. The latter imparts rotary motion to the first bevel pinion, driving another one mounted on an axle to which is connected another system of two levers. The end of the last lever is securely fastened into a sort of split brakeshoe fitted into the flywheel, which is, under ordinary circumstances, contracted by a spring, but is pressed against the inner face of the flywheel if a sudden lateral pull is exerted upon the end of the lever. Hence, the flywheel is turned over by the action of pressing down the pedal, and if the first effort should not bring about starting of the engine, the second will do so. The pedal lever being a long one permits of easy starting, and at any rate the use of the foot is more comfortable than that of the hands, which necessitates an unnatural position of the entire body of the cranker. After the engine is started and the pedal left to itself, it will automatically return to its original position, and be ready for use whenever it will be necessary. Back-kicks are avoided, and by means of this device a woman or child may start a car with little effort and perfect safety.

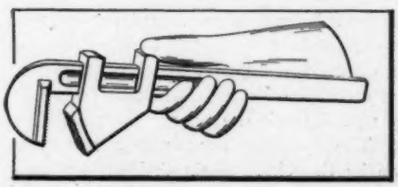


Fig. 5—Stover positive-working pipe wrench

Sico Overheat Alarm

INCORRECT timing, wrong mixture, poor cooling system, etc., are the causes of disaster, in that they favor overheating with its effects, such as scale formation in the cylinder jackets and such working conditions which in course of time will prove ruinous to valves, plugs and so on. The consequences of this nuisance being known to most autoists it remains but to signal them every time that the motor is in a state of overheating to make them so adjust the conditions that a more satisfactory performance may obtain. Recognizing a disadvantageous situation and supplying a remedy are two things, but the problem has been solved in this particular case by a simple adaptation to the need of a small and common member of the engine, viz., the priming cup.

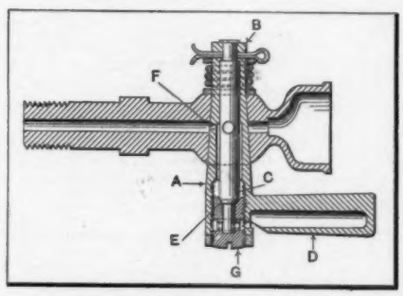


Fig. 6—Sico Priming Cup and Overheat Whistle Alarm

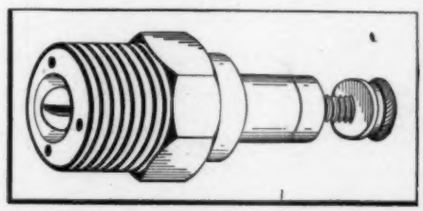


Fig. 7—Ballite Spark Plug, having no sparking points

The Sico alarm is shown in Fig. 6 on this page, and in its looks is fully alike to a regular pet cock such as is fitted into the cylinder head. The gasoline passage down from the funnel is intersected by a steel pin C located in the spindle A which on one side is of larger diameter to permit the hot gases from the motor to flow through the by-pass hole F into the space around the valve C seated at E. The valve spindle A is of brass and securely fastened to the steel pin at B, while G is a plug which may be screwed more or less deep into the spindle A. The handle D permits of turning the spindle and the pin inside of it into alignment with the gasoline passage.

After the motor has been primed, D is brought into the position shown, while the by-pass hole F is located a little above the gasoline passage. When the motor heats up, the brass spindle expands at a quicker rate than the steel core, and bringing F into alignment with the gas passage allows the hot gases to flow to the valve C, where they heat up the brass spindle. This unseats the valve, and the current of hot gas coming from the motor passes through the space under the valve and expanding into the hollow handle D produces a whistling sound. Screwing the plug further in raises the temperature, at which the signal is given, while a slight turn of the handle closes up the by-pass F. Thus the device combines the faculty of a priming cup with that of a thermostat. It is constructed and marketed by the Shore Instrument & Manufacturing Company, 555 West Twenty-second street, New York.

Positive-Working Pipe Wrench

ONE of the most important tools in the autoist's kit is the file, and almost next to it in importance ranks the wrench. Among the many styles of wrenches used for the various purposes the pipe wrench is destined to do the hardest work. Strong and sensitive, it must not be too much of either. The right proportion of these desirable properties is said to reside in the Stover pipe wrench, which is illustrated in Fig. 5. Quickly adjusted, it grips the pipe securely, and neither slips nor locks upon same. Owing to the bevel of the movable member of the wrench it cannot crush the pipe, and while it holds the latter as long as it is wished, a slight pressure of the finger serves to instantly release its grip. It is made by the Wright Wrench & Forging Co., Canton, Ohio.

A New Spark Plug

A NEW spark plug—the Ballite—put on the market by the G. A. Walker Machine Co., of 51 Chardon Street, Boston, Mass., is shown in Fig. 7. It has a porcelain core which is of a very high electrical resistance, and a unique packing system has been devised by the makers to prevent short circuiting as well as leakage of current. The metal core of the plug terminates in a ball securely embedded in the porcelain, and this arrangement makes wire electrodes with breaking, sooting and burning troubles. The base of the packing nut is bored through, forming three vents, constituting an outlet for foreign matter after every explosion, thus including in the device the self-cleaning feature. Whatever amount—it surely will not be a large one—of soot should accumulate in course of time, is easily taken off by a wire or brush run over the ball. The spring around the terminal post is screwed down as far as it will go, using the hand for this purpose, and this process insures the proper position of the plug at all times.

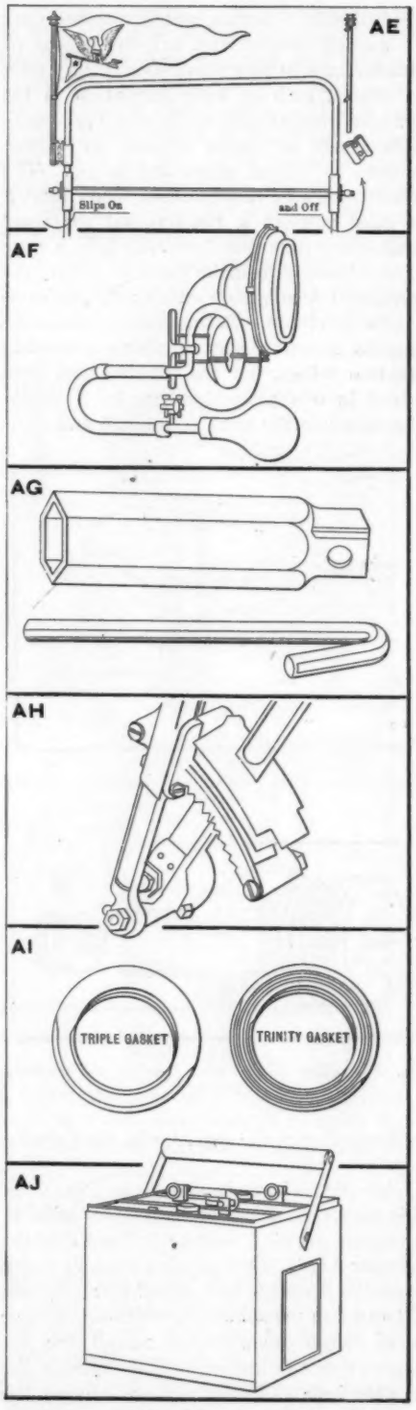
Seen in the Show Window

ONE of the refinements that will add greatly to the sport of participants of club and sociability runs, college graduates, baseball fans, etc., is the carrying of a pennant or two on the automobile. But as automobiles are being constructed at this time, such enthusiasm is not taken in account, and it was left for the Bon Tour Manufacturing Company of Cobleskill, N. Y., to offer to the automobiling public the Bon Tour Pennant Holder which is illustrated at (AE). The device is low priced and as simple as can be, in that a sleeve is slipped around one of the vertical rods of a windshield of the type shown, while the pennant is attached to the flag-pole which goes with the sleeve.

COMPETITION from other types of horns has greatly stimulated the makers of hand-operated signals during the last few years, and as an example of the development thereby brought about the Nonpareil horn is here offered (AF). Its tube connection is of brass, but a black or nickel finish may be supplied, if the customer so desires, and it may be said that the looks of this horn are no less uncommon than those of its non-mechanical rivals. The sound is in harmony with the instrument's exterior, so that it will fill the requirements of many automobilists. It is made by the Nonpareil Horn Manufacturing Company, 75 Wooster Street, New York.

THE fact that sparkplugs, hot or cold, ought to be removed only by means of suitable tools has been acknowledged by wise autoists long since, and as a consequence of their understanding numerous types of wrenches and spanners have been offered to the public for the purpose. They who go in for strong and substantial construction will be prone to consider the tool shown at (AG) for this work, the device illustrated being the socket wrench made by the Frank Mossberg Company, of Attleboro, Mass. The type shown fits a plug of standard make, the opening of the wrench being 29-32 inch at the unpunched end.

CONSCIENCE is a commodity which is sometimes not to be bought at a low price, and as some people lack the price as well as the goods they do not hesitate to avail themselves of such opportunities which a wide-awake conscience would forbid them to use. The coming of the automobile has made things better in one way and worse in another, since it offers some egotists quite a chance to use a machine for their private affairs without holding title to the car. But there is a way of restraining the abusers of a machine, and that is to so lock its mechanism that the motor may not be used to drive the car. The transmission being the link between the engine and driving wheels, it seems to be the best thing to lock the gear-shift lever in such a position that no power can be transmitted to the wheels as long as the gears are kept out of mesh. One simple and effective way to do this work is by the use of the Parker automobile lock (AH), one jaw of which is rigidly fastened to the quadrant, while the other may be turned upward around a hinge, leaving the transmission lever free to be moved or secured to the fixed jaw by means of a Yale lock. The makers of this lock, the Parker Automobile Lock Company, of 117 Chambers Street, New York, supply two keys with each lock.



(AE) Detachable holder for carrying a pennant on an automobile
(AF) The Nonpareil hand-operated signal
(AG) The Mossberg spark-plug wrench the "joy rider"
(AH) Circumvents the "joy rider."
(AI) Types of asbestos gaskets designed to overcome leaky joints
(AJ) National storage battery furnishes current for various purposes on an automobile

LEAKING joints are one continuous source of trouble in engineering, but where flanged pipes have to be put against each other, it is a mathematical certainty that water, air or gasoline will be lost unless a suitable packing is used to make the joint tight. The Cincinnati Gasket & Packing Company, of Cincinnati, Ohio, manufacture many types of such fittings, various materials being used for the various purposes, ranging from fibrous metallic packing for steam pipes to plain or multiple gaskets made of copper, plain or perforated, or in many cases of asbestos. The latter is equally impenetrable by water, gases and heat, and therefore is well fitted for most of its applications along this line. The Triple gasket and the Trinity gasket are shown at (AI), they being of the standard quality characterizing the output of their makers.

THE customary way of using electricity is to buy it from a central station or garage and keep it in a storage battery for use in the night. An efficient accumulator used in conjunction with tungsten lamps is a good way to prove one's modern ideas in the operation of an automobile, and among the many excellent designs of storage batteries now to be had the National is seen in the illustration at (AJ). A battery, if a large enough size is used, may be utilized not only for illuminating the path of the car, but to throw some light on the speedometer as well, and where an electric sound signal is installed the battery will furnish the energy to actuate it, too. The type of accumulator shown is made by the U. S. Light & Heating Company, 30 Church Street, New York.

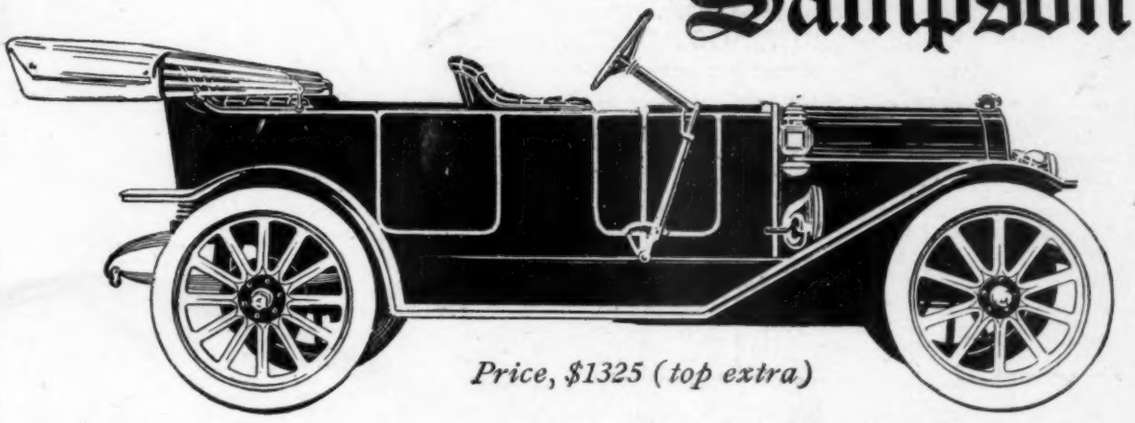
THE AUTOMOBILE

Vol. XXIV
No. 26

NEW YORK, JUNE 29, 1911

Weekly
Price Ten Cents

Sampson 35



Price, $1325 (top extra)

The Trinity of Excellence

Comfort means unalloyed pleasure in motoring. If your back aches, or your limbs become cramped after a few miles, you cannot feel the real motor exhilaration. Neither can you enjoy the scenery, no matter how picturesque, if you have a stitch in your side, due to sitting in an unnatural position.

In the Sampson 35, nothing that affects your comfort has been overlooked. A roomy tonneau, seats at the proper, scientific angle—padded with real hair—resilient cushion springs, seats the correct distance from the tonneau floor, and ample leg and foot room are a few features of this car.

Mechanical advantages which contribute to comfort, are a long wheel-base, large wheels, long flat springs, a low and safe center of gravity, a silent motor and transmission—all properly related—in fact the Sampson 35 is so comfortable, it is like riding in a Pullman, no jars.

Beauty of line, material and finish marks the Sampson 35. Any owner would be proud of it. The beauty of the car is apparent—highest quality finish, and straight, symmetrical lines. A glance will demonstrate the truth of this assertion. Exact knowledge of the demands of good taste gained through 15 years' experience in selling has refined the Sampson 35 until no car at any price excels it in grace and beauty. The long, low, straight lines speak for themselves — for beauty. So will the finish—the mahogany dash and rails, and upholstery, and similar details.

Strength —and speed, too—as typified by a United States armored cruiser—the Sampson 35 has both. It is as strong and enduring as a first-class warship, only swifter. The same careful detail that marks naval construction is evident in the building.

The materials in the Sampson 35 are the selection of sixteen years' experience in motor car building —the workmanship, the development of sixteen years' experience in organization and manufacture.

Built under such auspices the Sampson 35 could hardly fail to be staunch and able to meet the demands made upon it. Its design is right from the tubular radiator to the full-floating rear axle.

The Alden Sampson Manufacturing Company

Division of UNITED STATES MOTOR COMPANY

Broadway and Sixty-first Street — New York City

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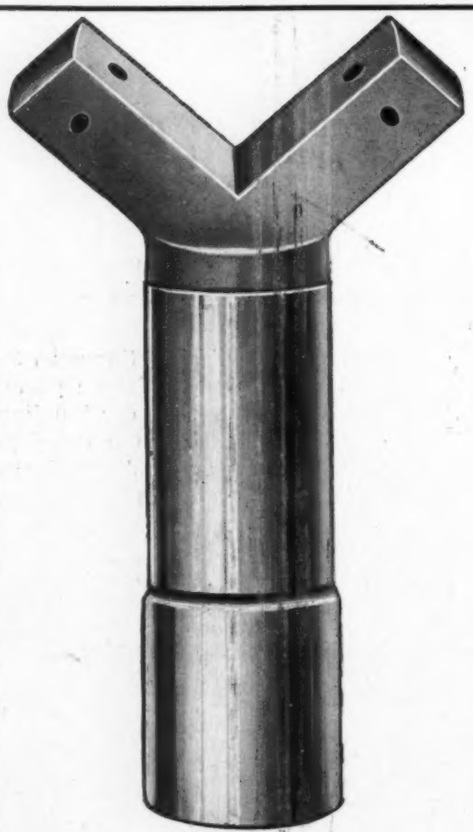

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MORE LIGHT
LESS GAS

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GERMAN LAVA
BURNERS

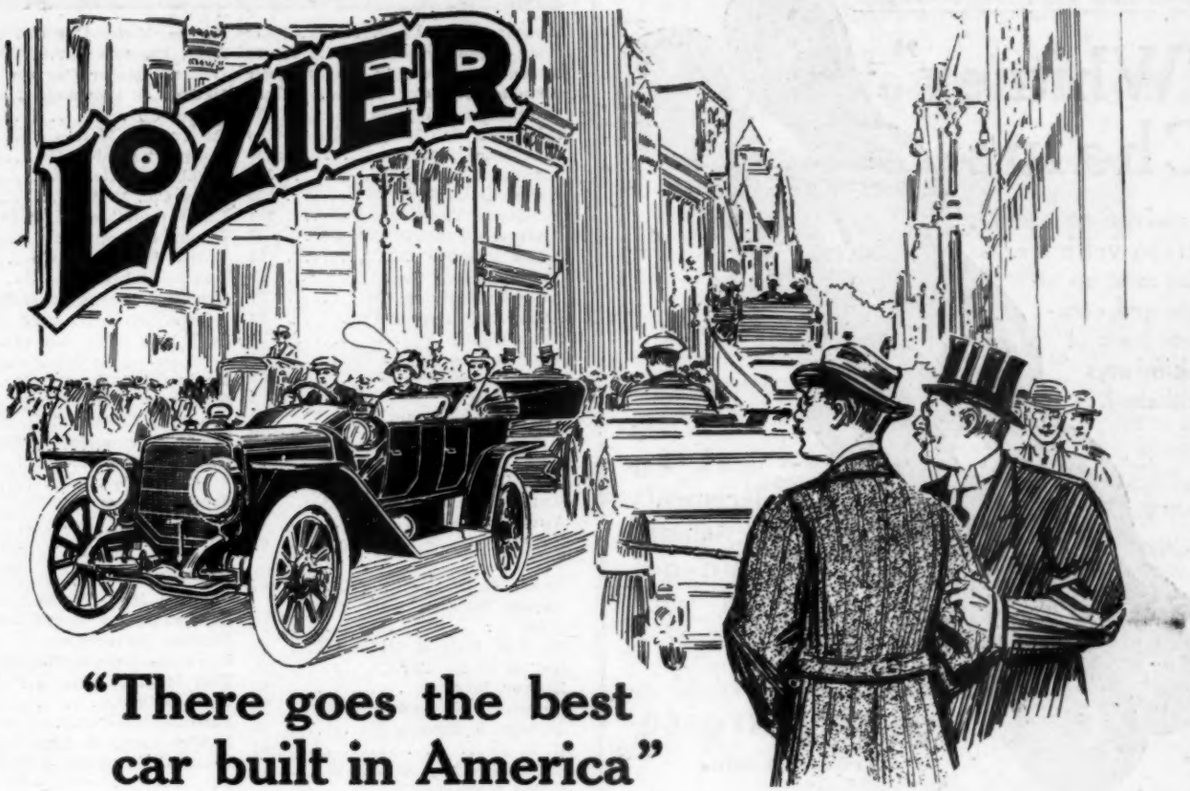
CAN YOU ASK FOR MORE?

THEN

GET 'EM TODAY—AT YOUR DEALER

PAUL J. KRUESI, Sales Manager

American Lava Co., Chattanooga, Tenn.



"There goes the best car built in America"

How often you hear that expression among *men who really know* motor cars.

Time was when, if you asked three or four automobile men to name the highest class American car, you would have received as many different replies.

Today if you ask this question of three or four well-informed men, probably two, and possibly three, will answer, "LOZIER." Everywhere you find this striking unanimity in assigning LOZIER first place.

Talk With Men Who Know

The man who knows is the man who has owned several cars—the man who puts his car to the severest touring uses. He is the man who tours far from the beaten track; who takes his car through unfrequented parts of Europe; whose annual mileage runs into thousands; who demands ceaseless, unfailing service.

These are *men who know*, and they recognize LOZIER supremacy.

You also hear LOZIER termed "The best car in America" by men in the trade—dealers, engineers, salesmen for other cars, managers of garages, officers of tire and accessory concerns.

The opinion of such men is the strongest endorsement; worth more than the experience of a man who has owned but one or two cars.

Never Marketed a Mistake

Most of the designers of medium-priced cars, if asked to pick out the best American car, would unhesitatingly name the LOZIER. Its worth has been proven by its consistent performances and by the fact that LOZIER has *never marketed a mechanical mistake.*

They know that LOZIER led in America in the use of improved features now recognized as standard—such as fore-doors, 36-inch wheels, ball bearings, long wheel base, four-speed transmission, multiple disc clutch, Bosch magneto, double ignition, etc.

First Place Won by Merit

LOZIER'S enviable position was not won by any sudden jump into popularity. It was rather the result of causes slowly working toward this end for years.

But gradually its repeated successes in the greatest contests and its unfailing satisfaction in owner s hands have established its reputation as America's highest-class car.

Today wherever you find people of wealth and discrimination—on city streets, at the clubs, the seashore, or the fashionable resorts—there., in increasing numbers, you find them driving the LOZIER.

The Agency for the Lozier Car is a Valuable Asset. Correspondence Solicited with Responsible Dealers in Any Unoccupied Territory

1912 Models
6 cyl., 51 h.p., $5000
4 cyl., 46 h.p., $4700
7 Styles in Bodies

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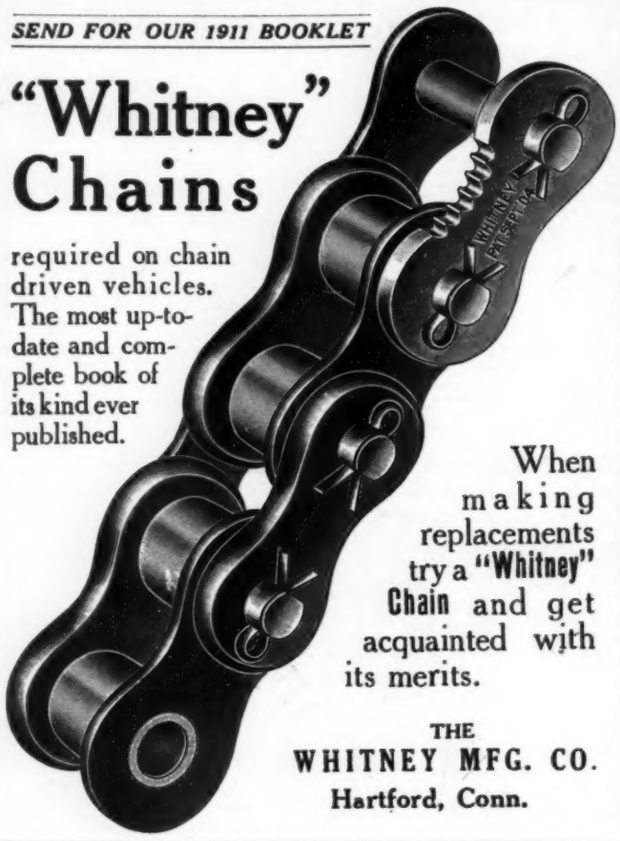
"Whitney" Chains

required on chain driven vehicles. The most up-to-date and complete book of its kind ever published.



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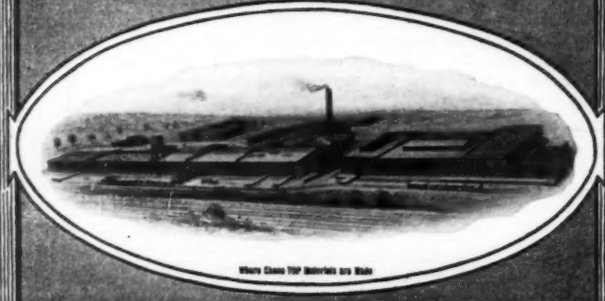
Chase Top Materials for Automobile Trade

Our Coating and Proofing is done entirely in our OWN MILLS, under our personal supervision and is QUALITY throughout.



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Use Almond Flexible Speedometer Casing to protect the shaft and lessen your Speedometer troubles.

Strain, Jar and Rust Proof. Insures proper and positive protection to shaft under all conditions of service. Substantial construction with the necessary flexibility.

Especially designed and made to increase Speedometer efficiency.

Used and Endorsed by Hoffecker Speedometer Co.

15 YEARS MANUFACTURERS OF FLEXIBLE TUBING

T. R. ALMOND MFG. CO.

Ashburnham, Mass.

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HERE is the simple, *logical* way of eliminating punctures and blow-outs. A heavy woven webbing slipped between inner tube and casing, and held in place by pressure—No bias places to pinch—Will not heat—Conforms to shape of tire.

Our great success has inspired imitators, see that every foot bears our name.

"Just as if the inner tube were that much thicker."

Delivered direct to any address, charges paid, on receipt of price

PRICE FOR ONE TIRE

28 x 3 or 3½	$1.50
30 x 3½	1.60
32 x 3½	1.70
34 x 3½	1.80
34 x 4	2.43
36 x 4	2.57

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"You can pay more but you cannot get better protection!"

WABAN WEBBING CO.

207 Essex Street, Boston, Mass.

Agents wanted in unoccupied territory

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A BARGAIN—Woods Electric Outside-Driven Landau. Body just like new, inside and out. Batteries and motors in perpect running condition. Price only $200. Just the thing for livery work. Chicago Motor Car Co., 2359 Michigan Blvd., Chicago.

A NEW 1911 Matheson Silent Six, 50 H. P., any style body desired. A great reduction from net price. New 1911 Pennsylvania 50 H. P. Quinby 5-passenger Touring body, $2,500. Regular price, $3,500. 25 H. P. Pennsylvania, $1,600. Regular, $2,500. Several used cars and demonstrators slightly used at very low prices. All above cars equipped with our light weight aluminum bodies.
J. M. Quinby & Co.,
Newark, N. J.

A PACKARD Roadster, 30-horsepower, 1909; fully equipped, guaranteed in A1 condition; run less than 8,000 miles. Price, $2,250. Wm. Burk, 301 W. Girard Ave., Philadelphia.

A RAMBLER 64 T. (1911), new; also an Elmore model 25 touring; been used for a few demonstrations, but in perfect condition and like new. Both cars fully equipped and will be sold at a substantial reduction to close. W. A. Root, Bennington, Vt.

ALMOST New Lane 7-pass. 1909 touring car (steamer), perfect condition; $700 takes it; we got it in litigation. F. H. Rowe, 301 Tremont Bldg., Boston, Mass.

AN early 1908 Pierce Great Arrow Car, in perfect condition. Specifications:
4 Cylinder, 40-45 H. P.
7 Passenger Body. Newly Painted.
Color, Wiley Wine deep.
New Top.
Banker, Double fold, Glass Front.
All new tires on car.
2 extra new tires.
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Prest 0 gas tank.
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Full set of tools.
Hartford shock absorbers.
Everything perfect. Will sacrifice if sold at once.
Keystone Auto Co.,
Titusville, Pa.

ATTENTION! Do you want to buy or sell an automobile? Good condition; guaranteed quick action. Josephine Ayres Exchange, 31 West 125th st., New York.

ATTERBURY 1½-ton truck; also 1,500-lb. delivery wagon; both good as new and great bargains. La Due-Carmer, 737 7th ave., New York.

AUTO for sale at a bargain. Ford runabout, almost new, fully equipped and in perfect condition, for $275; fully guaranteed; write or wire for demonstration; if you want a real good car act quickly. F. Frederick, 504 West 148th St., New York City.

AUTOMOBILES—Over Four Hundred Bargains; $95 upward; all guaranteed; shipped freight prepaid. Write now for latest illustrated bulletin. Motor Car Exchange, Dept. A, 213 W. 125th St., New York.

BARGAIN—Beautiful seven-passenger Rainier touring car, fully equipped; has Bosch high-tension magneto, windshield, Flandrau cape top, five lamps, Prest-o-Lite tank, horn, tools, etc.; recently overhauled and warranted by owner in perfect condition; sacrifice, $550. See Foreman, Glen Cove Trucking Co., 435-437 East 23d St., New York.

BAKER electric runabout; in good condition; new top; good tires; fine for use in city; owner leaving town, will sacrifice for $125.00. Call after 6 p. m. J. L. Hines, 1501 11th st., N. W., Washington, D. C.

BEST offer before Saturday takes seven passenger 1907 Haynes touring car. Haiss, 141st st. and Rider av., New York.

BUICK light delivery truck, 1910 model, 1,000 pounds capacity; in use every day; sell for $500.00 cash; need larger truck. Box 12, care The Automobile.

CHALMERS 30 Roadster with single rumble top, windshield, gas tank, etc. W. B. Mente, 1210 Second National Bank Bldg., Cincinnati, O.

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FOR SALE—Croxton French Type 30 Roadster; very fast and in first-class condition. W. B. Mente, 1210 Second National Bank Bldg, Cincinnati, O.

FOR SALE—Stevens-Duryea Little Six Touring Car; excellent condition; examination and demonstration can be had by addressing P. O. Box 130, Washington, D. C.

FOR SALE CHEAP—One Premier 1910 6-60 close-coupled Clubman; run less than 1,200 miles; all four (4) tires on this car practically new; also four (4) new casings and tubes extra.
Tire holders,
Tire covers,
Presto lite tank,
1 set Weed chains never been on,
Clock,
$75.00 Warm speedometer,
$50.00 Cox windshield,
Top and slip cover,
Klaxon horn and storage battery,
First-class condition,
Demonstration one mile or a thousand,
Original cost, $4,250;
First certified check for $2,000 takes it.
A. H. Hanna,
Troy, N. Y.

HUPMOBILE in perfect condition; has not run over 600 miles and it is practically new. Must sell quickly as I need the money. $400 takes it. Address H. W., 239 Hooper St., Brooklyn.

LATE 1909 National runabout, 60 h.p., 6 cylinder; guaranteed perfect; has 1911 Bosch dual system. Harry Simmons, Albany, N. Y.

LOCOMOBILE, 1909, Model I, 40, rebuilt at Locomobile factory March last; newly painted, new top and windshield; guaranteed like new car; price, $1,750. Will ship $100 with order, balance sight draft. Reason, ordered new 1912 Locomobile. Milton Flory, Bangor, Pa.

LOCOMOBILE, Type E., five-passenger touring body, top, windshield, clock, speedometer, tires new, extra tire, 2 tubes; all in good order and ready for work every day. F. E. Tomlinson, Bethel, Conn.

LOZIER 6-cyl. touring car, 7-passenger; full equipment; run only one season; newly painted; fine condition; $2,000. A. L. Pattee, 6 Beacon St., Boston.

MERCEDES, fully equipped, perfect running, slip covers, two top lamps, etc., $1,500. R. A. Humphreys' Sons, Philadelphia.

MERCEDES USED CARS at Reasonable Prices—Daimler Import Company, 751 5th Ave., New York, offer 35-h. p. and 45-h. p. Chassis Touring Cars and Limousines, in good running order. Telephone, 5946 Plaza.

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ONE 1910 Elmore, fully equipped; has not been run over 1,500 miles, as good as new.
One 1911 Cadillac in first-class shape; has been run less than 4,000 miles.
One 1910 Demi-Tonneau Cadillac, fully equipped.
For further particulars address,
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We are offering some very attractive propositions in '08, '09 and '10 five and seven-passenger four and six-cylinder Thomas cars, factory rebuilt and refinished, and backed by our guarantee.

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Used Car Department,
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Some very choice cars cheap.
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WILL exchange 60-horsepower Stearns roadster, equipped with new top and speedometer, for any kind of good touring car; must be in A1 condition. Address Manager, The Auto Owners' Supply Co., 1905 14th St., N. W., Washington, D. C.

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Replace that worn-out matting with Pyrma Aluminum Matting.
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Magneto Lighting Outfit, $5.00; Parabolic Reflectors, $5.00; Elevated Timer Brackets, $8.00; Transmission Case Oil Gauge, $1.50; Valve Stem Adjusters, $1.50; Valve Spring Covers, $3.50; Muffler Cut-out (complete), $1.50.

At your Ford Dealers, or sent prepaid on receipt of price.

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The most effective fire killer—any child can handle it.
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Controlling or minority interests in successful and unsuccessful automobile manufacturing establishments.
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AUTO Casings Retreaded for a limited time at the following prices:
28x3, $4.50; 30x3½, $6.00; 30x3, $5.00.
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Now is the time for you to get your old tires repaired before the season opens up. Do not throw away your old tires. If the rims are good send them to us and have them retreaded. We have facilities for doing the work properly—"Steam Vulcanizing."
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32x4	10.50	34x4½	14.10
30x4½	7.00	36x5	18.70
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Send them at once. A retreaded tire when properly done is far superior to a new second.
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THE BOSTON Brazing & Welding Co., New York Branch, 318-320 W. 48th St. Repairers of broken castings of aluminum, cast iron, steel, bronze, etc., all work guaranteed. Phone, Bryant, 1781.

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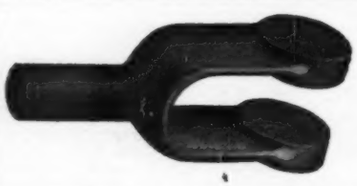

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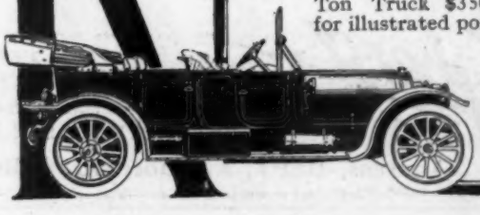

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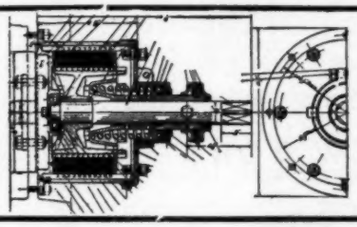

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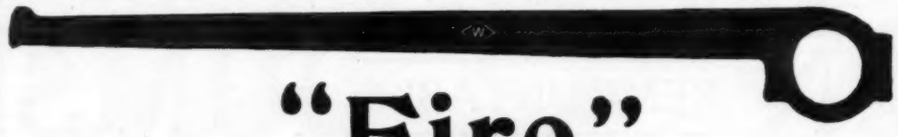

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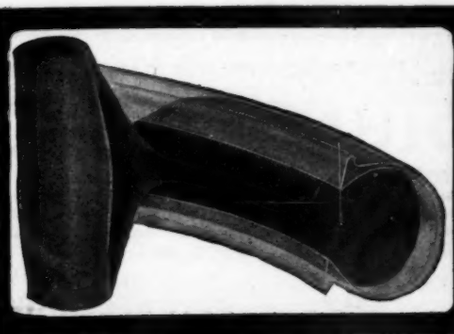

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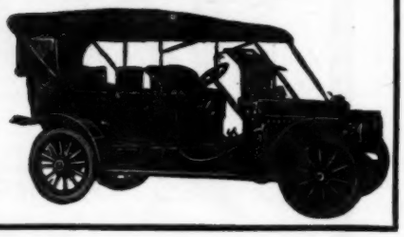

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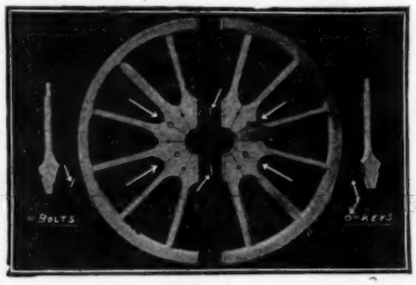

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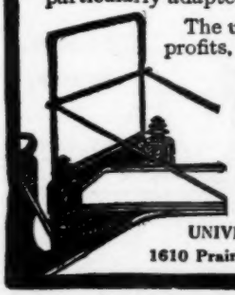

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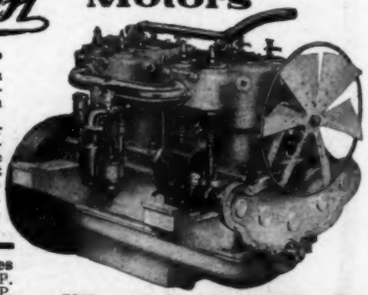

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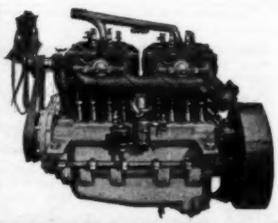

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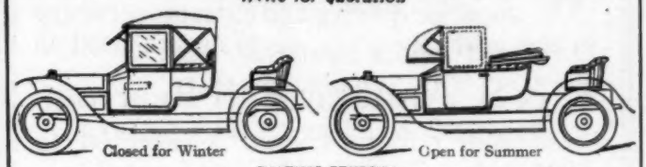

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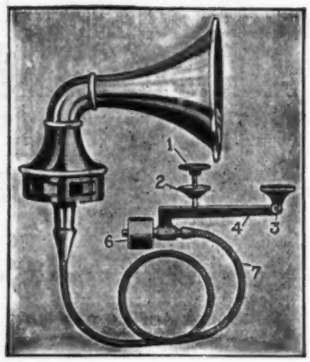
A Motor Driven Horn



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prevent 95 per cent. of punctures, blow outs and tube pinches.

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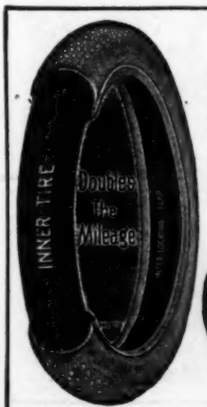

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Solve The Problem of Interchangeability
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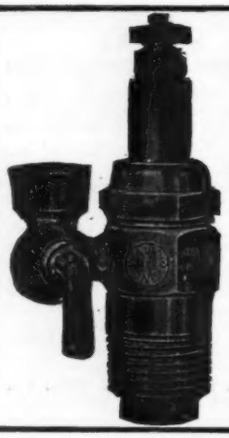

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JUST OPEN THE STOP-COCK AND OUT GOES THE SOOT
ALL-IN-ONE SPARK PLUGS have numerous other advantages.
You can stop any knocking in your motor by priming here with a few drops of kerosene.
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All of these advantages are contained in ALL-IN-ONE SPARK PLUGS, and they cost no more than the other kind. $1.50 each.
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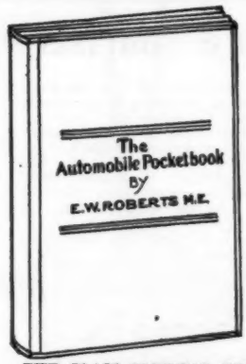

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A Compendium of the Gasoline Automobile
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The purpose of the author in writing this book has been to place before the designer and operator, in a concise manner, a few general notes on the design and operation of the gasoline automobile. Much of the material is the result of discussion with leading manufacturers as to construction, so that the information is of a thoroughly practical character, useful for every-day work. The various components and their functions are discussed in separate chapters, with suggestions for efficient operation and upkeep. The style is clear, and the book can be profitably read by the non-technical owner.
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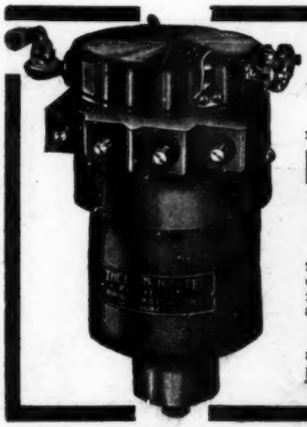

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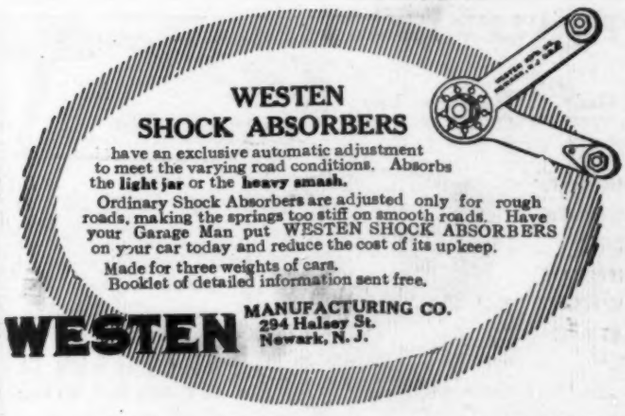

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You can if your car is equipped with The Electrodometer, the most practical trip odometer made. Has no flexible shaft—runs by electricity.

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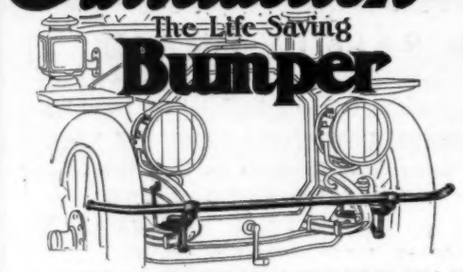

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Doubles tire mileage and prevents punctures and skidding.

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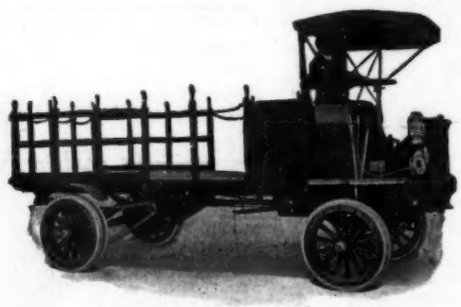

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are especially built to meet the conditions; are particularly attractive and have unusual endurance.

Two types are built, one $950, the other $2000. These wagons are in a class by themselves and are superior to anything that has ever been offered. We want agents every place for the delivery truck of the hour that is not only a money maker, but a friend maker.

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The KIMBALL STEEL PROTECTOR makes BLOW-OUTS, PUNCTURES, and RIM CUTS impossible. A few sections will hold any old blowout. Tires are as flexible as ever.
Send for detailed information.
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DECATUR ONE TON TRUCK

The accompanying cut shows a Model H Decatur truck that ran from New York to Boston, January 15, 1911, a distance of 265 miles, on 32 gallons of gasoline and 3 quarts of oil, in 19 hours and 40 minutes, actual running time, carrying a ton load the entire distance.

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Manufactured by DECATUR MOTOR CAR CO., Decatur, Ind., U.S.A.

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Model 45, Six Cylinders, ($4\frac{3}{8}$ x $5\frac{1}{4}$) 45-6 H. P.
Five Passenger, 126-in. W. B., $3,000 Seven Passenger, 132-in. W. B. $3,250

Model 50, Six Cylinders, ($4\frac{1}{2}$ x 6) 50-75 H. P.
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Model 60, Six Cylinders, ($5\frac{1}{2}$ x $5\frac{1}{2}$) 60-90 H. P.
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Austin Automobile Co., Grand Rapids, Mich.

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SHAFT & DRIVEN

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244.5 miles on a single charge over *average roads.* This record for electrics, made by a stock Baker Victoria with standard equipment of Edison batteries.

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A Real Commercial Truck
One that insures uninterrupted service and minimum cost of operation.

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One ton capacity—**30** horsepower, 4-cylinder, 4 cycle motor, progressive type sliding gear transmission, choice of platform, stake, panelled or covered express bodies, **$1950.**

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A four cylinder, four cycle Motor Car of 40 Horse Power

Worthy of your careful consideration—**price $3500,** fully equipped.

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One fixed idea is uppermost in the minds of the Oliver—to produce a commercial car that will give *service* the whole year round.

The Oliver gives that kind of service.

Capacity—1200 pounds. Prices—$1500 to $1600.

We Want a few more responsible, wideawake dealers ready to give their time and energy to pushing the Oliver.

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The Little Aristocrat
$950

There's just as much reason to use a 50 or 60-horsepower motor to carry two passengers as there is to use a 10-ton hammer to drive a tack.

THE EMPIRE TWENTY—LOGICAL IN SIZE AND POWER

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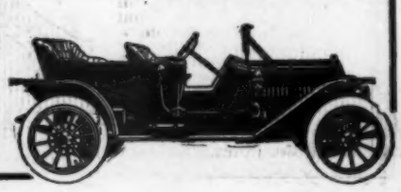
All touring models fitted with removable front doors and panels at a slight extra charge.



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1912 Model Completely Equipped as shown $600

Four cylinder motor twenty-two HP, valves and all moving parts inclosed and dust proof. High tension magneto ignition. 10,000 miles on set of tires. Ask for book "E" with hill climbing guarantee. Good dealers wanted in unoccupied territory. Capacity 10,000 Cars per year

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A car of noble lines and distinguished lineage.

At $2100, it is a value so remarkable that before you purchase any car you should, in simple justice to yourself, investigate the new Haynes models.

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Four cylinder 40 H P long stroke motor built in our own shops. Strong on hills, speedy when desired. 114 inch wheel base, 34 inch wheels, selective type sliding gear transmission.

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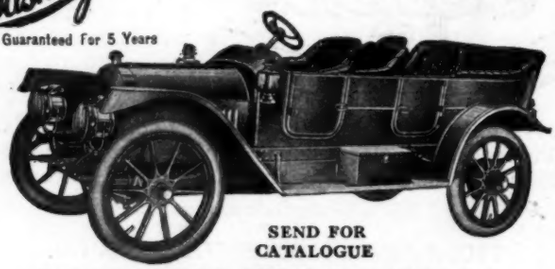

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CORBIN

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No better car can be had at any price. Large, powerful and easy riding—a mechanical masterpiece.

Sold with complete equipment, including top wind shield. Warner Speedometer, demountable rims and trunk rack in addition to the most regular equipment which goes with most other cars.

Fully described in 1911 Catalogue E

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THE ONLY CAR

that has a Unit Power Plant *flexibly* suspended from frame at three points. Many makes have three point suspension but not *flexible* suspension. ¶ What does this mean? In the opinions of leading unprejudiced auto experts it means *absolute* and *perfect independence of all frame strains—perfect alignment of shafts and bearings* at all times—*greatest efficiency in transmission of power* and *longest life of entire power plant.* Many makers have tried to secure a *flexible* suspension—only the Midland has succeeded. ¶ This is but one of many distinctive features that make it

MIDLAND THE MASTERPIECE OF CAR CONSTRUCTION.

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$2500 Complete

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For four years our **"3 IN 1"** cars have been the most satisfactory and popular low-priced cars on the market. Their easy convertibility from runabout to touring car or delivery wagon gives them a unique advantage over any other car in their class. They offer you the best chance to cover this wide and profitable field. *Write today for Catalogue.*

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In every contest it has entered the Franklin motor truck has been a winner.

Let us make an engineering analysis of your present truck service. If the Franklin truck can save you money, we will show you how and where.

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After you have tried out the smaller car and want something better, bigger more powerful and with that exquisite finish which only the high grade motor car possesses

The Knox

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car will fill this craving for the utmost in automobile value. It is built by a Company who thoroughly believes that a sale is never finished while the car is in commission.

A post card brings our catalog—the most complete description of a motor car that is issued.

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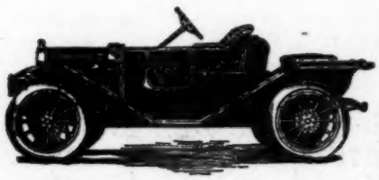

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No Clutch to Slip.—No Gears to Strip.—No Grease Packing to Renew.—No Universal Joints.—No Bevel Gears.—No Noise.—No Trouble.

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If interested—write for full particulars

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Nine Models, $1200 to $1750

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The 1911 FORD catalog and other literature will tell you why. Write for it.

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COLE 30—$1,650

The Car You'll Be Proud To Own

The same mechanical perfection and graceful symmetrical lines found in the new popular models of the highest priced cars are embodied in our

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Compare it with any $2,500 car—we'll abide by your judgment.

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New Cole Flyer Speedster 36-40 H. P. $1,650

Write Today for Booklet

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TOY TONNEAU
$2150

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The Car of Perfect Control, Silence and Comfort. If the Petrel is not represented in your vicinity, write us—to-day—before the opportunity is gone. Immediate delivery.

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FLANDERS "20"

The cars that have made the high price automobile a fad

E. M. F. CO., Automobile Manufacturers
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1911 IMPERIAL 1911

MODEL 50—$2000	MODEL 35—$1650
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Model 44

IMPERIAL
AUTOMOBILE CO.
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VAN "22"
The Car for You

$850

THE "ONE BEST BET" in the Small Car Class. A classy, fast, thoroughly well built and properly designed Roadster. Made for the man who knows a good car from a poor one and appreciates the difference.

The Best Built Roadster in America

Four cylinder, valve in head motor, 3 3-4 in. by 4 in., cast in pairs, 22.5 h. p. Three speed and reverse sliding gear transmission. Sheldon 35 h. p. set axles, 96 inch wheelbase, 32 inch wheels. Magneto. Electric lights and all usual equipment. Write us for territory.

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10 Popular Models 2, 4, 5, 7 Passenger Cars
$1000.00 TO $2000.00

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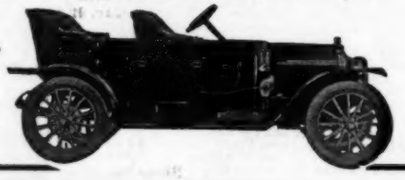

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The cars of unparalleled achievements and unprecedented quality—the cars that have created national attention by their quality and low price.

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Mc-I-N-T-Y-R-E Spells "Satisfaction"

The Car That Carries Conviction.

A McINTYRE AGENCY is a real business asset for any Dealer. The great and rapidly increasing demand for the McINTYRE LINE is an absolute assurance of large profits to the Agent who is enterprising enough to secure a McINTYRE CONTRACT to handle the "Car That Carries Conviction."

MODEL A-5 35 H. P. $1350

W. H. McINTYRE CO.
Dept. A., Auburn, Ind.

SEND FOR 1911 FREE CATALOG

4 CYLINDER CARS
24 to 40 H. P.
$1,500 to $2,250

KLINE KAR

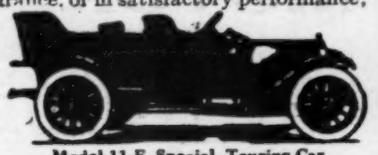
6 CYLINDER CARS
50 to 60 H. P.
$2,650 to $3,250

The KLINE KAR is an honest car, honestly designed, honestly constructed, and honestly sold. The Kline Kar is the full overflowing measure for the money it cost you. In justice to yourself you cannot afford to purchase without a thorough investigation of the Kline Kar.

B. C. K. MOTOR CAR COMPANY, York, Pa.
Write for Catalogue and Territory

Speedwell **$2500 to $2900**

More than this car offers cannot be bought.
—It concedes nothing to its costliest contemporary in structural soundness and strength; in luxury; in ease and comfort; in dignified appearance, or in satisfactory performance;
—But brings you notable features of design and build that are peculiar to itself.



Speedwell Motor Car Company
10 Essex Avenue
DAYTON, OHIO

Model 11-F, Special, Touring Car
7-Passenger, $2900—5-Passenger, $2750
Standard chassis of all Speedwell models has 121-inch wheel base and 50 H. P. motor.

The Electric

with the lowest hung body, longest wheelbase, easiest entrance, most knee room, easiest riding springs —It's

The Borland Electric Brougham

The remarkable price of $2200 is possible simply because we have not set a premium upon its quality features. Write for descriptive literature

The Ideal Electric Vehicle Co. Show Room "A," 1330 Michigan Ave. Factory, 312 E. Huron St., CHICAGO

F·A·L-CARS
MADE IN CHICAGO

TOURING CARS
ROADSTERS
SPEED CARS

All Models $1850

Write for Catalogue. *OUR RECORD "TALKS"*

171 N. May St. F-A-L MOTOR CO. CHICAGO, ILL.

THE MARMON
"The Easiest Riding Car in The World"

Closed Front Touring Car, $2,750

There is satisfaction, of course, in owning a car of the highest international reputation. But there is no end to this satisfaction when the car lives up to its reputation so handsomely in daily service as does the Marmon.

NORDYKE & MARMON CO., Indianapolis, Ind.
(Estab. 1851) Sixty Years of Successful Manufacturing

HUPP-YEATS ELECTRIC

No other electric is comparable with this—in beauty of design or in mechanical excellence. It is the first electric coupe to sell at $1750—and at that price incorporates all the luxury and dignity of the costliest cars.

EXIDE BATTERIES, STANDARD EQUIPMENT

R. H. C. SALES COMPANY
Dept. A. 100 Lycoste St., Detroit, Mich.

STAVER
CHICAGO

Every dealer who has taken up the new Staver Dealers' proposition for 1912, is enthusiastic about it. If *you* haven't heard it, write us today.

STAVER CARRIAGE CO.
76th and Wallace Streets, Chicago, Illinois

AUBURN·1911·

"The Most for the Money"

The car that is so noticeable that it cannot be overlooked and so impressive that it cannot be forgotten. The car that embodies mechanical perfection and that is finished like a work of art. 40 H. P. Touring Car, $1,750.
It's the kind that sells itself.
Let us tell you more about it.
Some territory left.

AUBURN AUTOMOBILE CO., Auburn, Ind.
Factory: Auburn, Ind. Eastern Office: 737 7th Ave., New York.

Dorris 1911

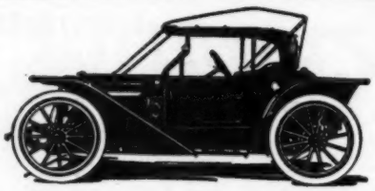
MOTOR CARS

Built to last

$2500 Complete Equipment

Some desirable territory still unallotted

Dorris Motor Car Co., 22 S. SARAH ST. ST. LOUIS, MO.



K-R-I-T Model "U"

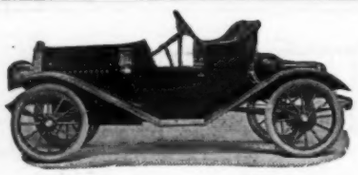
UNDERSLUNG RUNABOUT

The Sensation of the Shows

Four Other Models $800 to $1275

AGENTS: This is the liveliest proposition of the year. Write at once for terms, etc.

K-R-I-T Motor Car Co., Dept. A, DETROIT



THE WHITING ROADSTER--$775.00

A manufactured—not an assembled car. A nobby car—that will stand up under road work. It is built right. Write for catalog and prices.

WHITING MOTOR CAR CO.

Owned and operated by The Flint Wagon Works, FLINT, MICH.

Cable address (Western Union Code) "Whitmore."

THE COLBY 40

(Develops Power of a "50")

A year ahead of them all in construction, value and price.

$1750

Demountable Rims. Every part standard. Write for liberal proposition to dealers.

COLBY MOTOR CO., Mason City, Iowa

New York Representative: Empire City Automobile Co., 1800 Broadway

$1,500

LOUIS J. BERGDOLL MOTOR COMPANY

DEPARTMENT "S"

31st and Dauphin Sts. Philadelphia, Penna.

PENNSYLVANIA

4 and 6 CYLINDER CARS

Unexcelled in Workmanship
Unequaled in Design
Unsurpassed in Equipment

A car whose value is so unusual and demonstrated efficiency is so great that it approaches finality in motor car construction.

PENNSYLVANIA AUTO MOTOR CO.

BRYN MAWR, PA.

McFARLAN 1911

THE BEST 6 Cylinder Car Regardless of Price

$2000

fully equipped and ready for the ROAD

Some territory still open.

McFarlan Motor Car Co., Connersville, Ind.

Write for Agency Proposition

Abbott-Detroit

Abbott Motor Co

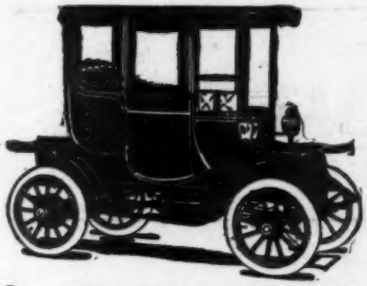
141 Waterloo St., Detroit, Mich.

These cars will be some of the most extensively advertised cars this coming year.

HALLADAY

A Great Line of Cars. Nine Different Models. Price Range, $1100 to $2650. Dealers with foresight will get in touch at once for 1911. Everybody likes our way of doing business. You would too. *Write us NOW.*

Streator Motor Car Co. Streator, Ill.



Detroit Electric

THE STRAIGHT PATH

of Power, direct from motor to gear. Absolute control and safety assured. This is the car, not of fashion alone, but of quality and distinction. The most fastidious woman, in daintiest dress, will find this brougham a joy. No crowding, no dust, no noise to jar on ears polite, no complicated mechanism to strain the nerves. Graceful lines and faultless furnishings make this a Reception Room on wheels. Write for literature.

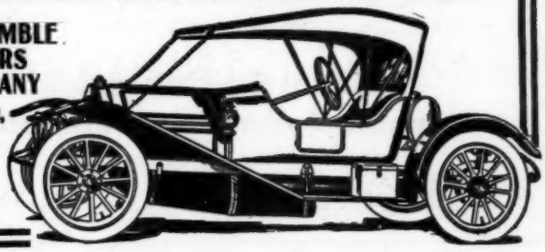
Anderson Electric Car Company
DEPARTMENT 16 DETROIT, MICH.

DE TAMBLE

The Cars That Look to Cost Twice Their Price. **And the Cars That Are As Good As They Look.**

No one can understand why we sell this elegant roadster for $1000. Many other models at equally attractive prices. Write for catalog.

DE TAMBLE MOTORS COMPANY
Anderson, Indiana.



CLARK "30"

Open Touring Car $1000
Torpedo Roadster
Four-door Touring Car 1050

motor 4 x 4½, 114" wheel base, 32 x 3½" wheels. 34 x 3½ Tires and Demountable Rims, $25.00 extra. No Deposits—Liberal Discount.

CLARK MOTOR CAR CO.
Shelbyville Ind.

Run a Whole Season Without Fouling Your Engine

THIS we guarantee. Go and come, when and where you like—under the most severe conditions. Run your car to the limit. Drive it for all it's worth. Take the steepest hill. You can do all this without fear of a set-back if you regularly use Monamobile Oil month in and month out. You can run for a solid season without fouling your engine. You can increase your speed and get greater power. It costs you no more than the so-called first-class oil, and you get more in the end, for it reduces your up-keep, cuts out delays and annoying stops on the road.

Monamobile Oil

is compounded by lubricating experts, who know what an automobile engine needs to give the longest and best service; who know how to make an oil that will not carbonize.

We sell direct to reliable dealers, and you pay no more than you would for oils that ruin your engine. Remember we guarantee to run your car a whole season without fouling your engine, and we stand back of this absolutely. You cannot know too much about automobile lubrication. We have a mighty interesting book on this subject. It was compiled by expert oil compounders. You can and should have it. Send a letter or a postal today. We will be glad to send you one *free*. We'll show you what you are missing in motoring, and how Monamobile Oil can help you. What you've never had before—perfect lubrication.

MORE GOOD DEALERS are wanted to sell Monamobile Oil. Our "Exclusive Sale" offer will appeal to any dealer who is interested in building up a big, steady paying business. Write us for full particulars today.

MONARCH MFG. CO.
Box 102, Council Bluffs, Ia
Toledo, O. St. Paul, Minn.
1133 Broadway, New York.
251 Minna St., San Francisco.

ATLAS CHAIN

A THREE TO ONE PROPOSITION

And still demand increases—a logical outcome of the placing upon the market a chain that will positively be "on the job" after three ordinary chains are in the scrap pile.

We have proved it—thousands of Atlas Chains now in use are proving it—you can prove it if you will—

IS FURTHER ECONOMY AN OBJECT?

If so, bear in mind that the original (and only sane) construction of the inner surfaces of Atlas Chain cross members makes them absolutely harmless to tires, no matter how roughly you use your car.

Those who use this anti-skidding device are therefore—

Buying one set of chains while others are buying three—

Saving chain wear on tires when others are injuring the same at every revolution of the wheel.

The price being about one dollar higher than that of ordinary chains, what then will Atlas Chains be worth to you?

ATLAS CHAIN CO.
Bush Terminal No. 4, Brooklyn, N. Y.

"A Summer Outing Above the Clouds"

HOTEL KAATERSKILL

CATSKILL MOUNTAINS Elevation 3,000 Feet

Opens for the Season of 1911 on THURSDAY, JUNE 29.

THE REJUVENATION OF THIS FAMOUS RESORT

For the first time in its history this resort has been leased to a New York hotel man, MR. LOUIS FRENKEL, fourteen years proprietor of the Hotel Albert.

The Hotel has been renovated and put in first class condition.

Climate and location unequalled either in Europe or America.

Commodious garage, boating, fishing, golf links, tennis courts, bowling alleys. Excellent accommodations for conventions. Assembly room seating 1,000 persons. Symphony Orchestra. A modern Rathskeller, with reasonable prices. Special attractions and inducements for the younger set.

SPECIAL RATES FOR FAMILIES

Transient Rates, $4.00 per day and up according to location of room.

For reservation of rooms and information address

HARRISON S. DOWNS, Manager.

HOTEL KAATERSKILL, Kaaterskill, P. O., N. Y.

"The Speedway at Indianapolis is the most thoroughly well contrived place of its kind in the world"—EDITORIAL FROM AUTOMOBILE.

The Speedway, built under No. 1 specifications of the National Paving Brick Manufacturers' Association, proved flawless in the wearing and tearing 500-mile International race.

The merits of the Indianapolis Speedway can be adapted to the roadway YOU are interested in seeing improved.

Copies of No. 1 specifications and "The Indianapolis Motor Speedway" can be had for the asking.

National Paving Brick Manufacturers' Association

WILL P. BLAIR, Secretary

824-826 B. of L. E. Bldg. CLEVELAND, O.

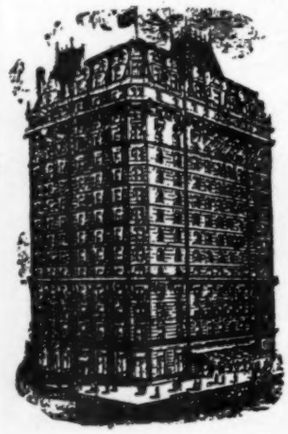
"In the Heart of Things"

Hotel MARTINIQUE

ABSOLUTELY FIREPROOF

Broadway, 32d-33d Sts., Herald Sq., New York City

One Block from New Penn. R. R. Depot and opposite HUDSON TERMINAL, connecting with Erie, Lackawanna, Lehigh Valley, Pennsylvania Railroads



FROM WHICH

Baggage Transferred Free To and from Hotel

In the midst of leading Department Stores and Theatres

600 Rooms 400 Baths

ROOMS WITH USE OF BATH $1.50 up

ROOMS WITH PRIVATE BATH $2.50 up

The table d'hote Breakfast at 60c. a Specialty

Write for further particulars and latest map of New York City free.

Chas. L. Taylor, President W. S. Gilson, Vice-President
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ALSO PROPRIETORS OF ST. DENIS HOTEL.

Hotel La Salle

Chicago's Finest Hotel

George H. Gazley, Manager La Salle at Madison Street

The central location, excellent service, elegant equipment and furnishings, and home-like atmosphere make Hotel La Salle the most popular hotel in Chicago.

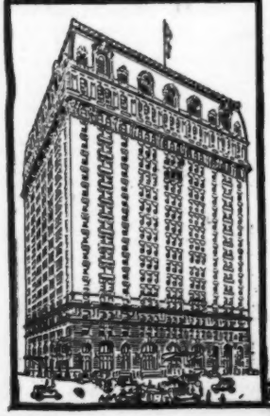
Rates:

One Person.

Room with detached bath - - - - $2 to $3 per day
Room with private bath - - - - $3 to $5 per day

Two Persons.

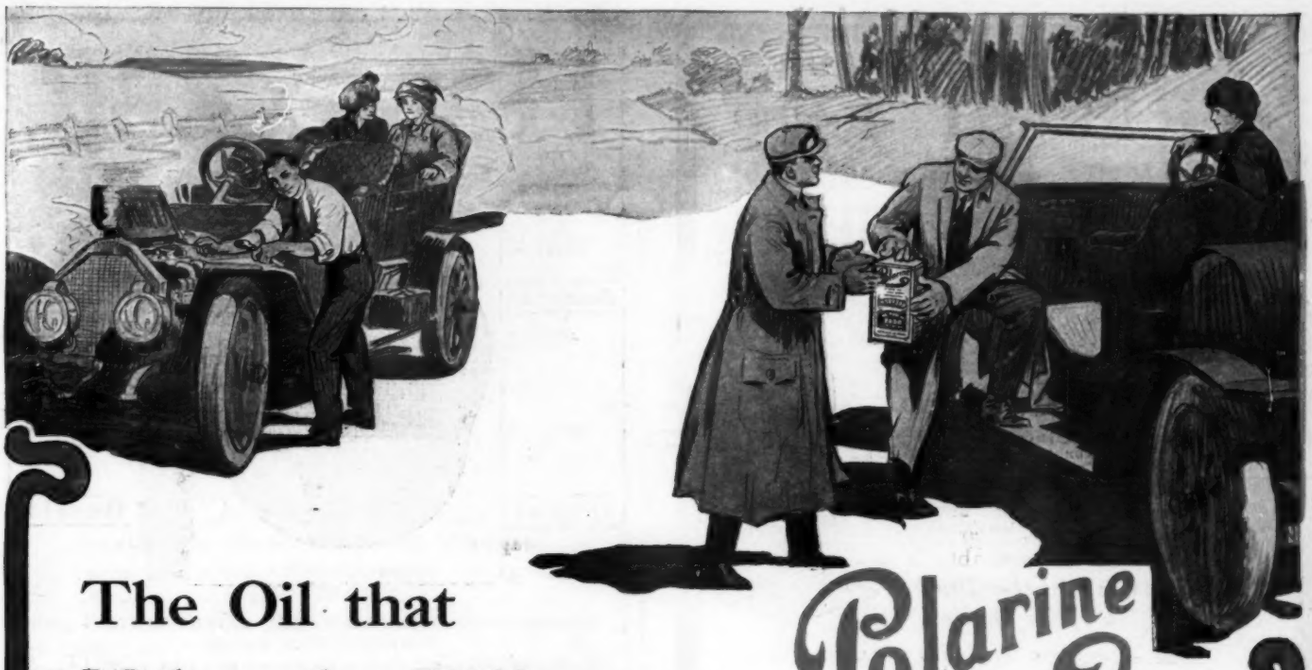
Room with detached bath - - - - $3 to $5 per day
Room with private bath - - - - $5 to $8 per day



Two Connecting Rooms with Bath:
Two Persons - $5 to $8 per day
Four Persons - $8 to $15 per day

Suites:
$10 to $35 per day

All rooms at $5.00 or more are the same price for one or two persons



The Oil that Makes the Difference

Polarine

"I do not care so much how my cars are run," said a leading manufacturer the other day; "it's how they are oiled that counts."

That manufacturer, like all other automobile experts, knows from experience that proper lubrication is the most important factor in the satisfactory operation of a car.

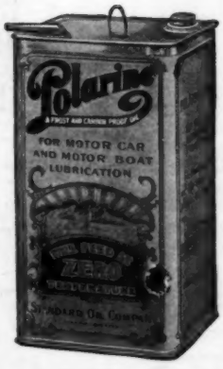
He could tell you, as other experts have proved, that POLARINE, the Carbon-proof, Frost-proof Oil, is the best oil for motors of any make.

Polarine maintains its efficiency at all degrees of temperature.

It so lessens friction it adds life and power to your engine.

Polarine leaves cylinders, valves and spark-plugs free from carbon. You do not have to clean them all the time to keep the engine running right.

It insures smooth running, long service, and complete, uniform lubrication.

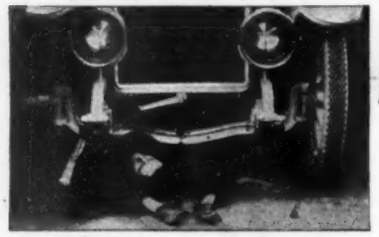


What Polarine Oil is to the motor, Polarine Transmission Lubricants and Polarine Greases are to the other wearing surfaces of your car.

Send for the Polarine Booklet to the nearest agency of the

Standard Oil Company

(Incorporated)



A Disastrous Accident

Impossible When the

BARRETT AUTO JACKS

are used as each Jack is constructed of refined malleable iron and high carbon steel and thoroughly tested before leaving the factory. The Barrett Auto Jack is quick acting, scientifically designed, representing the result of 30 years' experience in Jack Manufacture. It is the one Jack that will not go back on you when far from home.

If it isn't the Jack that Duff built it isn't the Barrett

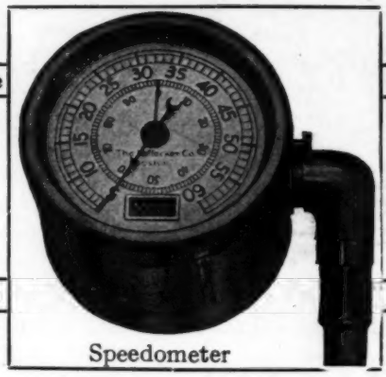
Write today for Barrett Auto Particulars or ask your dealer

THE DUFF MFG. CO.
ESTABLISHED 1883
50 CHURCH ST. NEW YORK. PITTSBURGH, PA.

HOFFECKER

"The Steady Hand"

Accurate Efficient



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Quiet Durable

ENDORSED BY MANUFACTURERS, EXPERT DRIVERS AND OTHERS WHO KNOW

Backed By a Clean Record of DEPENDABILITY for Five Years

Satisfaction Guaranteed

PRICES—$25 TO $135

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The HOFFECKER CO.
Main Office
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Automobile Parts

Specialization *means* Superiority

OUR PRODUCTS:

Pistons
Piston Rings
Piston Pins
Cam Shafts
Motor Gears
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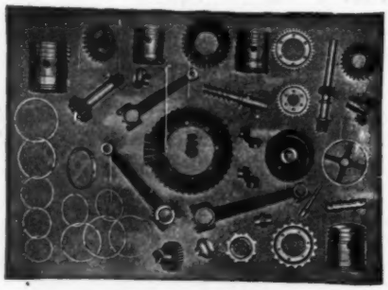
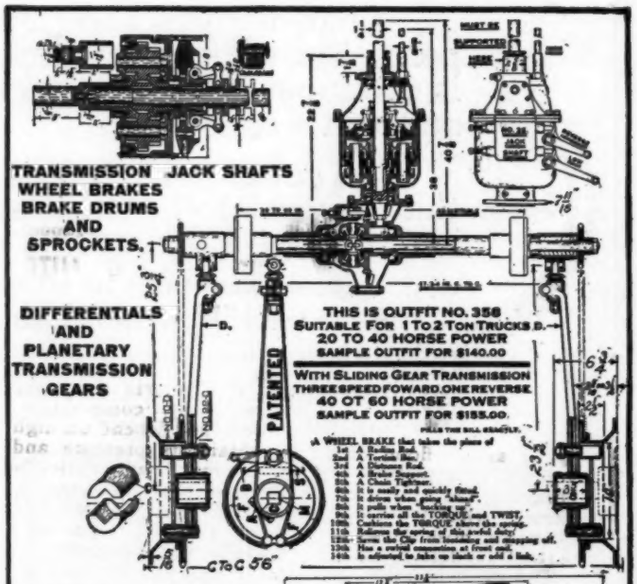


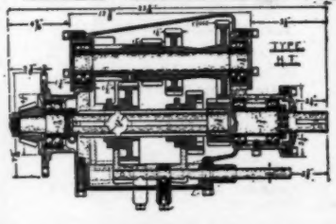
producing a large volume of Automobile and Motor Machine Parts, we offer you a superior product at a consistent price, and rid your factory of troublesome details.

Let us also submit estimates on your die-cast Bearing Bushing requirements. We have a special department of our business devoted to this product.

We make a special point of Helical Cut Motor Gears, the only correct solution of the motor gear problem, and Integral Cam Shafts, with Cam Contours ground after hardening.

THE F. W. SPACKE MACHINE CO.
INDIANAPOLIS, IND.





HEAVY BUILT
SLIDING GEAR
TRANSMISSIONS
3 SPEEDS FORWARD,
ONE REVERSE
FOR 20 TO 60
HORSE POWER. FOR
TRUCKS CARRYING
1 TO 4 TONS

SEND 10 CTS. IN STAMPS FOR LARGE CATALOGUE

MUNCIE GEAR WORKS, MUNCIE, IND.

THE NEW **KAMLEE AUTO TRUNK**

is absolutely dust proof

See the new Interlock Edge—It makes the Kamlee air tight

Regular Kamlee

The edges of drop front and top lock together as shown in sectional view at left. A rubber tubing at bottom of groove conforms to any irregularity or give in top and front.

Every Kamlee is fitted with two or more standard sized removable suit cases, which can be removed without taking trunk from rack. Kamlees are made to fit any car.

A waterproof covering is fastened over the top with patent spring-swivel nuts. No straps to bother with in opening.

Look for this trade mark on lower right corner of trunk.

See the new Kamlee at your dealer's. If he doesn't have it write for prices and booklet.

THE KAMLEE COMPANY

236 Broadway, Milwaukee, Wis.

Open—showing suitcases

BOSCH AGAIN

The best time on Algonquin Hill, as in days gone by, was made with a Bosch Magneto. Hearne in a 120 h. p. Benz—the victor.

Exacting Drivers Choose Bosch

Bosch Magneto Company

223-225 WEST 46th ST., NEW YORK

Detroit Chicago San Francisco

Let Your Motor Pump Up Your Tires

Remove a spark plug.

Screw pump into spark plug hole.

Run engine a few minutes and tire is hard and round.

THE SKINNER AUTOMATIC TIRE PUMP

It pumps the air you breathe, converts the heat generated by compression, and does not depend on high speed and a flood of oil to obtain its pressure and volume. Its pistons are air cushioned, automatically checking the length of stroke and prevents wear or damage when pumping against a deflated tire, or when changing hose from one tire to another; a patented feature rendering the device absolutely fool-proof.

The price is final. No further expense for installation or adapting after the purchase of this device.

Strong—Compact—Light—Carried in the tool box—It is instantly available for service at all times without expert mechanical knowledge or up-keep expense on the part of the possessor.

Price $20.00 Each

Pressure Gauge $3.50 extra. 10 Days' Free Trial to responsible owners. Give name and model of car and size of spark plug when ordering.

Skinner & Skinner Co., 1713 Michigan Ave. CHICAGO

Says The Arco Kid:

The smile of the chauffeur who uses ARCO SPOTZOFF is as bright as his brasses—and that's going some!

The metal polish that doesn't settle hard in the can; doesn't deteriorate with age; and saves half the work of polishing.

The Atlantic Refining Co.

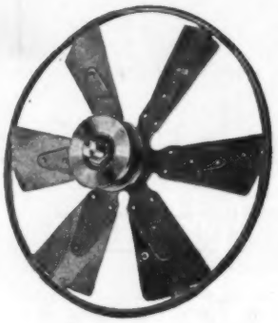
Spotzoff Department

6412 Euclid Ave., Cleveland

REG. U.S. PAT. OFF.

ARCO SPOTZOFF

Radiator Fans and Pressed Metal Stampings



Patented

We guarantee our patented one piece blade fan, with pressed steel hub and spider to be the lightest, strongest and most efficient fan on the market.

Our large capacity insures you prompt deliveries.

Let us furnish your requirements. Ten standards in stock at all times.

A large majority of manufacturers have specified with us for 1912. Do not delay; let us send you a sample now for inspection and test.

Get complete catalog.

Also ask about the following Auto Parts:

BALL BEARINGS
BATTERY BOXES
BRAKE DRUMS
HUB CAPS
FLANGES
HUBS COMPLETE

The Sparks-Withington Co.
JACKSON, MICH.

Fedders Radiators

Watch us grow. It is just two years since we moved into our new plant at our present location. Now we are adding another large building, which will more than double our capacity. Our output for the 1911 season is pretty well disposed of, but with our increased facilities, we will be able to handle a few more customers who appreciate the value of

The Real Square-Tube Radiator

FEDDERS MFG. WORKS
BUFFALO, N. Y.

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USED IN THIS
PUBLICATION
ARE MADE
by the
MOSS
PHOTO
ENGRAVING CO.
PUCK BUILDING
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NEW YORK
TELEPHONE 81 SPRING
ESTABLISHED 1871

100%
Knowledge of Your Business

will be obtainable instantly if you install

With Only One Writing **The McCASKEY SYSTEM** The End of Drudgery

Every transaction, cash or credit, is handled with The McCaskey System. It will tell you more about your business in five minutes than you can learn from a set of books in a whole day.

The McCaskey System will make you independent of your books. It will give you information when you want it and how you want it.

The McCaskey System cuts out useless bookkeeping—prevents forgetting to charge, prevents errors, prevents disputes, improves collections and

FLAGS YOU AT EVERY DANGER POINT

Seventy thousand in use. Sold on payments if desired. Will you risk a one-cent stamp and ask for more information? Booklet D gives it. Write to-day before you forget it.

THE McCASKEY REGISTER CO., Alliance, Ohio
Agencies in All Principal Cities.

¶ If you are going to tour this summer, then order *The Official Automobile Blue Book*, and do it to-day.

¶ Remember, the Blue Book will save you while touring much annoyance, time and money.

Annoyance, the result of running miles out of your way through taking vague verbal advice—

Time which you will have to spend in getting back to the right road—

Money which you are bound to lose in putting up at hotels and patronizing garages where you get only excessive charges and mediocre service.

THE OFFICIAL AUTOMOBILE BLUE BOOK will direct you unerringly—showing every turn, hill, railroad crossing and landmark.

It will tell you in detail all about mileage and road conditions.

It will give you the name and location of those establishments on the route where you will be rightly served.

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910 S. MICHIGAN AVE., CHICAGO

Please mention The Automobile when writing to Advertisers

World's Record of 40.32 sec. for Stock Straight-away Mile

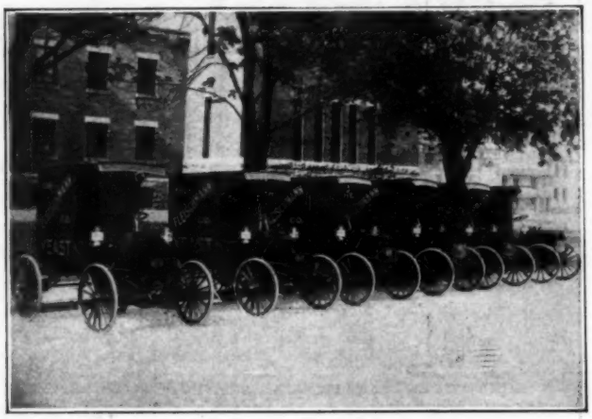
Regardless of what you're willing to pay for motor car service and satisfaction—Investigate the

National 40

A thoroughbred car at $2,500 and $2,600 that has seldom been equaled at any price and never excelled.

National Motor Vehicle Co.
1000 East 22nd St.,
INDIANAPOLIS, INDIANA

Chase Motor Vehicles Selected by the Big Ones Who Know



And selected in quantity lots.
The Berlin Dye Works, of Los Angeles, seeking to solve its delivery problems, tried out the standard makes of commercial cars and then placed an order for twenty-five Chase Motor Wagons, because they proved the most economical and efficient—the superlative of every thing a motor truck should be.
They are only one of many large users of Commercial vehicles who are using Chase Cars in preference to all others.
We would be glad to tell you why the Chase can show a record like this.
If you use one or more horses in your delivery we are waiting to hear from you.
We can save you money.

CHASE MOTOR TRUCK CO.
90 WYOMING ST. SYRACUSE, N. Y.

Schafer
Combination Radial and Thrust Bearing

CONSISTING OF ONE PIECE

Carries both Radial and Thrust Loads.
Requires same space as the ordinary radial bearing.
Can be used where both a radial and a thrust bearing are required.

Most suitable for differentials, clutches, axles and steering gears.

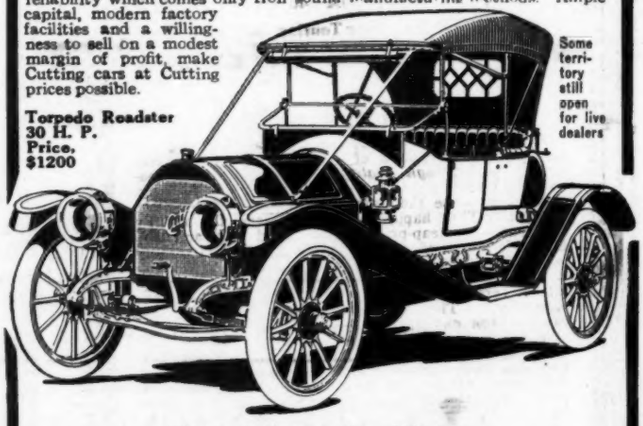
BARTHEL, DALY & MILLER
42 BROADWAY, NEW YORK

Cutting CARS

Continue to grow in popular favor. The reason—they give satisfaction—they have distinctive style—give uniform service. They have that sterling reliability which comes only from sound manufacturing methods. Ample capital, modern factory facilities and a willingness to sell on a modest margin of profit, make Cutting cars at Cutting prices possible.

Torpedo Roadster 30 H. P. Price, $1200

Some territory still open for live dealers

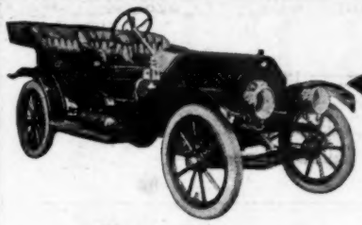


This car is the sensation of the year.

A single glance will impress you with its surpassing style and its prepossessing general appearance. Its 116-inches wheel base, its commodious body, richly upholstered, its 30 horse-power 4 cylinder, long stroke motor, its finish in French Grey with Black stripings all contribute to make the Cutting Torpedo Roadster the "best buy" of the season.

Let us send you our Catalog telling why. Also tells about our full line.

CLARKE-CARTER AUTOMOBILE COMPANY, Jackson, Mich.



PRIMO

Five Passenger, $1,750
Baby Tonneau, $1,600
Torpedo Roadster, $1,500

A Perfect Score in the "Round-the-State (Georgia) Tour"—1,130 miles without an adjustment, repair, puncture or blowout. Used by Atlanta Journal and New York Herald for 2,500 miles of scouting service between Atlanta and Jacksonville, Fla. Not necessary to lift hood once, except for oiling purposes.

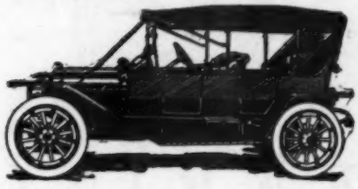
Classy Lines ¶ Unusual Hill-Climbing Ability ¶ Negotiates the Worst of Country Roads

CATALOG UPON REQUEST

PRIMO MOTOR CO., Atlanta, Ga.

Write for Information About

THE SELDEN CAR FOR 1911



The Selden Car stands for every desirable development in the automobile—from the powerful perfectly constructed engine to the evenly balanced quality parts that go to make the finished car.

A wide range of body styles and prices. Roadster, touring and torpedo bodies. New four- and six-passenger torpedo bodies with fore-doors.

From $2250 to $2600

With complete touring equipment.

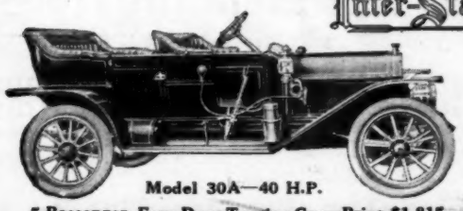
Good territory still open for live agents

SELDEN MOTOR VEHICLE CO.

Geo. B. Selden, President ROCHESTER, N. Y.

Licensed Under Selden Patent

Inter-State



Model 30A—40 H.P.

5-Passenger, Fore-Door Touring Car—Price $1,815

INTER-STATE

Here Is a Peculiar Car

Peculiar in this respect: It is *the* "high-quality-sane-price" automobile of America. Its peculiarity lies in giving *high quality* at a sane price, a reasonable price.

Do you sense the unique position the Inter-State occupies? That happy medium between the rapidly constructed, cheap-priced, short-lived car and the high-priced car of the *few*, to whom an extra thousand or so dollars is of small consequence.

But the many, many, many present-day automobile buyers figure that extra thousand dollars very carefully. The Inter-State offers *more* for the money *than any car in America.*

You are one of two men. You may be the man who has decided to put about $1,000 in a car. Or you may be the wealthier cousin who can put four or five times that amount into his car. In either case, please halt long enough to consider the *real value* idea in the Inter-State. That happy medium will prove most satisfactory.

The entire story of the wonderful value offered in the Inter-State is given in a good, common-sense catalog, which is free.

INTER-STATE

INTER-STATE AUTOMOBILE CO., Muncie, Ind. Dept A 11

Branches: 153 Massachusetts Ave., Boston; 310 S. 18th St., Omaha
Canadian Branch, Hamilton Machinery Co., Hamilton, Ont., Canada

FROM OUR BARRELS TO YOUR BEARINGS

Kejex

"THE CAN THAT'S A GUN"

delivers K-000 Grade NON-FLUID OIL — and that's assurance of the easiest and cleanest as well as the most efficient lubrication.

New York & New Jersey Lubricant Co., N. Y.

United Manufacturers

Distributors:
250 W. 54th St., N. Y.

PILOT

THE CAR THAT'S MADE GOOD!

These cars are scientifically constructed—of best materials and perfect workmanship. Classy Design and Handsome Finish place the Pilot in the front ranks of motor cars sold at a thousand dollars more. Every car rigidly inspected before leaving the factory.

SEND FOR BOOKLET

Pilot Motor Car Co., Richmond, Indiana

BALL

B L C

BEARINGS

Single and Double Row.
Radial Thrust. Cone Type.
Magneto Bearings.

German Material—American Make,
Means

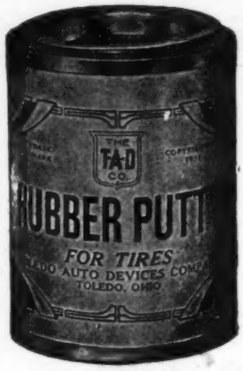
High Quality—Low Cost

Catalogue on Request.

B L CO., **Norwich, Conn.**

RUBBER PUTTY

The Greatest Invention of Its Class. A True Money Saver and a Protection to Life and Limb.



RUBBER PUTTY

Prevents blowouts, avoids sand blisters, saves fabric from decay, keeps out water, causes tires to wear out evenly and smoothly.
Requires no cement, will vulcanize itself, is applied in 5 minutes, does not soil the hands. Saves over $50 in the season, gives safety in speeding.

Price, $1.25, post-paid

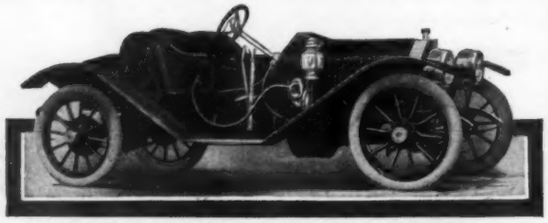
Our Novelty Booklet will interest you

THE TOLEDO AUTO DEVICES CO.
710 GARDNER BUILDING, TOLEDO, OHIO

Your First Impression of the Cino

is good, but when you get thoroughly acquainted with its construction you'll have numerous occasions to be pleased at finding how the various features—so nicely worked out in detail—prove a considerable relief from the care which you have been accustomed to exercise in this respect with other makes. Motoring in a CINO is just one round of pleasure. *Send for catalogue. Agents write us.*

HABERER & CO. CINCINNATI, O.



"Cino" Semi-Racer $2250.00, fully equipped.

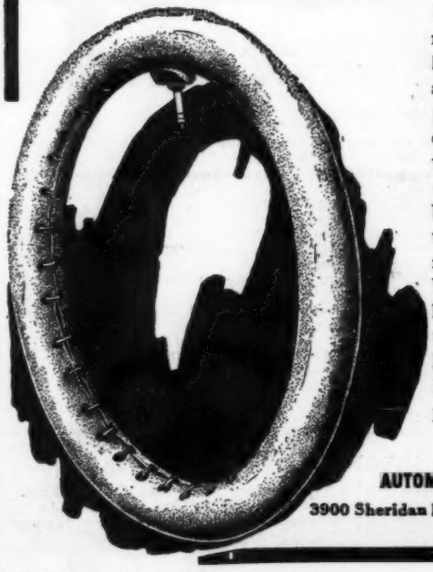
How To Prevent Tire Troubles

Is very clearly and fully explained in our little booklet

"THE CARE AND WEAR OF TIRES"

If you own an automobile, you cannot afford to be without it, as it will help you to

Reduce Tire Expense 50% to 75%



It tells you how to make new tires last 10,000 miles and over. It explains how to wear out your tires without the great annoyance of blowouts, and how to keep your tires in proper repair. We will send a limited number of these valuable little booklets FREE, postage paid, on request.

WESTERN AUTOMOBILE SUPPLY CO.
3900 Sheridan Road, Chicago, Ill.

Splendid Service Departments

In 16 of the large cities in this and other countries, coupled with the liberal Stewart policy and

Five-Year Guarantee

are a few of the

Reasons why *Stewart Speedometers* outsell and outwear all others

Another triumph for Burnam and the Stewart Speedometer

POSTAL TELEGRAPH-CABLE COMPANY

NIGHT LETTERGRAM

413aubx 23 Nl
Milwaukee Wis June 20-1911
Stewart & Clark Mfg Co.
1848 Diversey Blvd., Chicago.
I succeeded today in breaking mile track record here. Your speedometer proved of great value to me and was always on the job.
922p Bob Burnam

Stewart & Clark Manufacturing Co.

1852 Diversey Boulevard, Chicago, U.S.A.

Detroit: 1211 Woodward Avenue
New York: 1878 Broadway
Chicago: 1312 Michigan Avenue
San Francisco: 307 Golden Gate Avenue
Los Angeles: 1212 South Main Street
Philadelphia: 608-10 North Broad Street
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HARRIS

TRADE MARK—REG. U.S. PAT. OFF.

OILS

are really different from other oils, and we urge a comparison, the only true and satisfying test

"HARRIS" Oils BEST meet, under all conditions and requirements, the exacting demands of Automobile Lubrication, and you will find that they are not only the BEST VALUE, but the cheapest in the end, for a little goes a long ways and every drop counts.

The established price of "HARRIS" OILS is practically no more per gallon than what YOU are asked to pay for substitutes of INFERIOR quality, therefore INSIST on having "HARRIS" OILS and let nothing deter you from making a comparative test on your own cars and under your own conditions.

Obtainable of Dealers, or write direct to

A. W. HARRIS OIL CO. 326 S. Water St., PROVIDENCE, R. I. 66 Wabash Ave., CHICAGO, ILL.

MILLER'S PAN-AMERICAN

Motor Cylinder Oils

are refined from the finest grade **Pennsylvania Crude** and are pure, distilled, highly filtered mineral oils.

GEAR CASE COMPOUND

Made in Three Densities—Light, Medium, Heavy

All have a low cold test and high melting points and retain their various consistencies at varying temperatures.

In order to convince you of the efficiency of these lubricants we are willing to make you a **special price** for an initial order, much lower than usually quoted on other high-grade oils and greases.

Complete Catalog Mailed on Request

The Largest Auto Supply House in America.

CHAS. E. MILLER

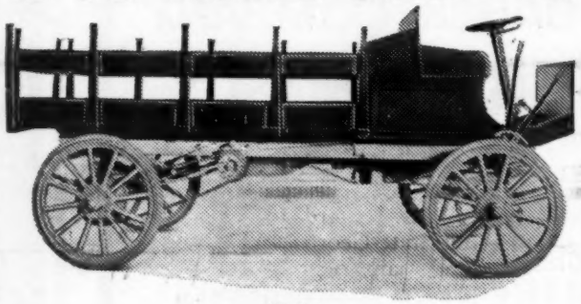
Manufacturer, Jobber, Exporter and Importer

Home Office: 97-99-101 Reade Street, New York City

BRANCHES: Philadelphia Boston Cleveland Detroit Buffalo Hartford Atlanta Brooklyn New York City New Orleans

Special Prices quoted to Manufacturers, Dealers and Garages

CAMERON



$1400

SPECIFICATIONS

Maximum load capacity, 2,000 lbs.
Engine—24 H. P., 4-cylinder.
Transmission—Cameron patented system; three forward speeds and reverse; direct drive on all speeds.
Gearing to suit conditions under which car is to be used.
Wheel base, 108 in.
Wheels, 36 in., 2½-in. solid tires.
Body dimensions back of seat, 8 ft. 6 in. long by 4 ft. wide, inside measurements.

VITALLY SUPERIOR

The truck that during the non-productive hours is not an expense.
The truck that does work every day in the year if required.
The truck whose efficiency is not affected in any way by climatic conditions.
The truck giving maximum service, from fuel and lubricant, thereby showing minimum cost per ton mile.
The truck that is of such simplicity and directness of design that it is practical for the operator of average ability.
The Cameron Air-Cooled Motor and Patented Direct-Drive-On-All-Speeds Transmission put this truck into a class alone.
Write for our catalog. Investigate our claims. Have a demonstration.

CAMERON CAR CO., General Office, Beverly, Mass.
Works: Beverly, Mass., Attica, Ohio, Alma, Mich.

WHY IS IT Thousands of Auto Owners Use Bowser Tanks? Here's the Answer:

Because Bowser Systems meet every requirement of the purchaser.
They store the gasoline underground in a heavy steel tank, retaining its latent strength, which means more miles per gallon.
The gasoline can be transferred from the underground tank directly to the car with either a self-measuring or a non-measuring pump, filtering it in the same operation. The pump can be placed just where you want it.
You can't buy an underground system costing less than a Bowser, or as good a one at any price.
We Make the Lowest Priced Systems and We Make the Best.
We can fit your fancy at the price you wish to pay.

Their Economy Pays Their Cost

Ask for "The Smile of Satisfaction," No. 3-B. It says little—Tells a lot—Is worth having—It's Free

S. F. BOWSER & CO., INC.
Fort Wayne, Ind.

BRANCHES: Boston, New York, Philadelphia, Dallas, Chicago, San Francisco, St. Louis, Minneapolis, Atlanta, Toronto.

BOWSER

Fresh Victories for
SPLITDORF
At Guttenburg, June 17

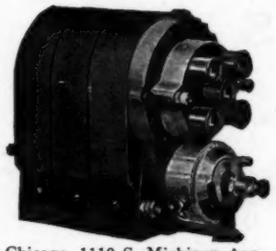
5 miles, Non-stock, Class E, 231 cubic inches, won by Burke in a SPLITDORF equipped E-M-F. Time, 6.09.

10 miles, Non-stock, Class E, 450 cubic inches, won by Koopmann in a SPLITDORF equipped National. Time, 10.42 2-5.

10 miles, Class E, 600 cubic inches, won by Whalen in a SPLITDORF equipped National. Time, 10.30 2-5.

Again the Efficiency of the SPLITDORF is clearly demonstrated.

You can have the same Perfect Ignition on your car by equipping it with SPLITDORF Magneto.



Please write for Magneto catalog.

Chicago, 1110 S. Michigan Ave.
San Francisco, 520 Van Ness Ave.
Detroit, 868 Woodward Ave.
Boston, Motor Mart.
Los Angeles, 1226 S. Olive St.

C. F. SPLITDORF
Walton Ave. and 138th St.
Branch, 1679 Broadway, New York

OHIO MAINTENANCE EXPENSE

Maintenance means much to the motorist. No matter how well able a man may be to afford to do it, the little extra expenses for which he has to dig down in his pocket always unexpectedly, are very exasperating.

It is annoying, to say the least, to feel that every time one goes out he must carry fifteen or twenty dollars to be on the safe side in case of breaking something.

The driver of an OhiO car will never have to hunt up the country blacksmith or the repair man in order to get home. He knows, too, that his lubricating oil is not being used to oil the road, as in some cars; his gasoline is being converted into power to the last atom, and that power is made available through accurate workmanship.

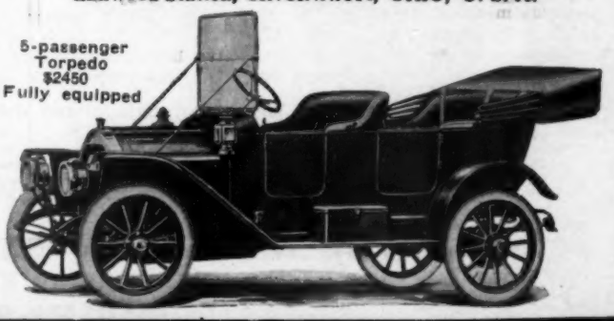
OhiO cars are finished with the greatest possible care and with the most durable materials, and it will take at least two long, hard seasons to tell materially on their appearance.

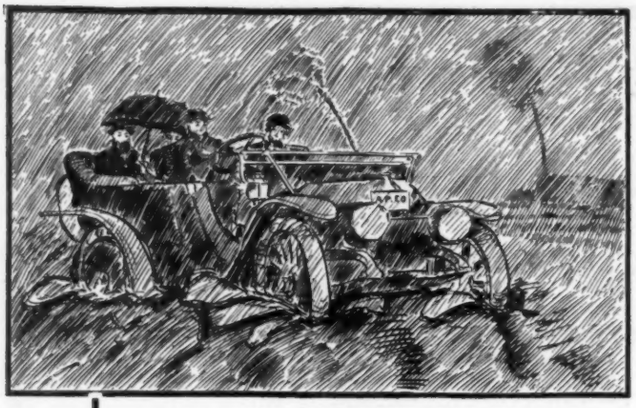
The OhiO record is hard to equal—the Glidden Tour, the Round-State-Georgia Tour, the New York to Frisco run and many other stunts of equal merit, but less fame, have demonstrated that OhiO cars are most inexpensive to maintain.

Send for our Catalog 100 and our 3 Coast Tour Booklet—they are full of information valuable to the motorist.

THE OHIO MOTOR CAR COMPANY
Elmwood Station, CINCINNATI, OHIO, U. S. A.

5-passenger Torpedo $2450 Fully equipped





A Real Test of Endurance

Mud, Sleet, and Rain—

The real test of the durability of the highly polished finish on a car.

Few cars have a finish that can come through this test with flying colors—mighty few will retain their original lustre and shine even when thoroughly washed and polished once more.

If you would have your car stand this gruelling test build the bodies and all the sheet metal parts of

ALUMALOYD SHEETS

RUST-PROOF

They actually hold the highest possible finish. They are more than rust-proof—they are mud, sleet and rain-proof. They make possible the all-metal car—the car of to-day.

Alumaloyd Sheets are the one perfect sheet metal for bodies, hoods and all sheet metal parts. Their smooth, velvety finish requires less material and less labor to obtain a perfect finish than any other construction material—and it holds this perfect finish.

Alumaloyd Sheets will prove a profit maker and a money saver for you. Your inquiry will bring a sample and full particulars. ***Will you send it to-day?***

The Alumaloyd Products Co., Canton, Ohio

FULL FLOATING ADJUSTABLE TYPE

Driving member is inserted as a unit and may be adjusted in place.

Housing is stamped from sheet steel. This construction provides strength at the points where the strain is the greatest.

Internal and external brakes are 14-in. diameter.

Axle shafts are made from alloy steel. "Heat treated" so as to give the highest physical properties possible.

Pinion and driving shaft are integral. Forged from alloy steel "heat treated." Teeth are planed.

Can be equipped with annular or roller type bearings.

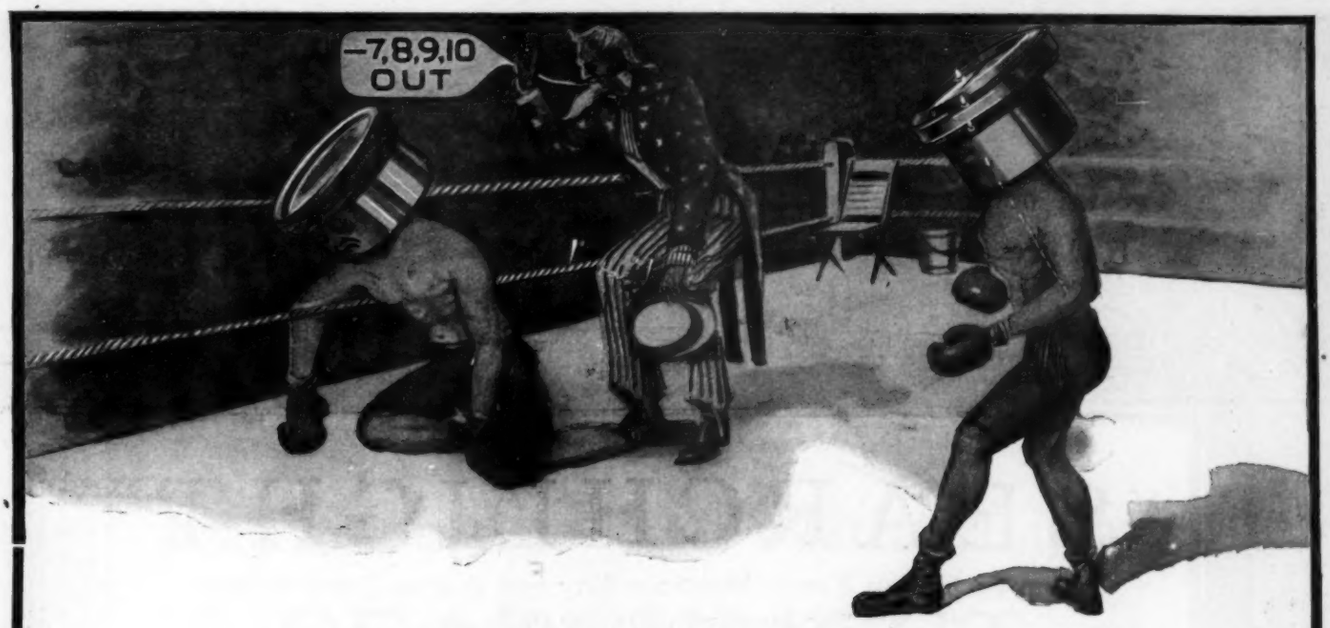
The design, material and workmanship on this axle are of the highest quality.

WRITE US REGARDING YOUR REQUIREMENTS

THE AMERICAN BALL BEARING CO.

L. S. & M. S. RY. and EDGEWATER PARK

CLEVELAND, OHIO



KNOCKED OUT

¶ You know now, that centrifugal force is the ONLY ACCURATE PRINCIPLE for speed-indicator construction—impervious to heat, cold and electrical influence. Therefore the Jones Speedometer is THE instrument for you to use because it is absolutely and unerringly accurate. Get a JONES—the ONE speedometer that is geared to the truth and indorsed by the U. S. Bureau of Standards and the leading universities.

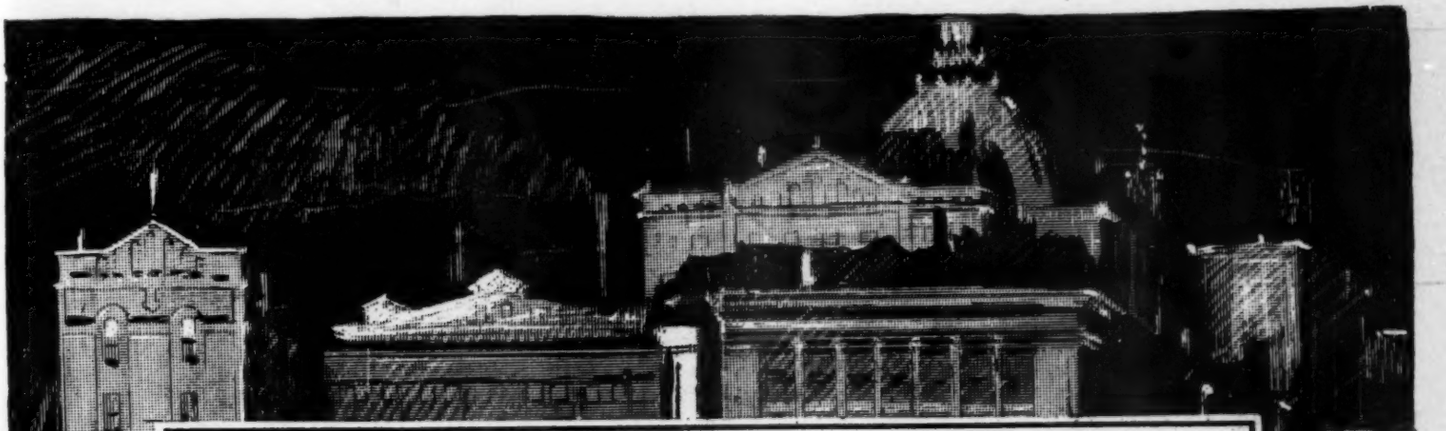
¶ According to the *Army and Navy Journal*, "Magnetic instruments are so inaccurate as to make them practically useless"—surely YOU DON'T WANT THAT kind for your car.

¶ The magnetic type of speed indicator has "taken the count," knocked out, so far as accuracy is concerned. Tests made by the United States Bureau of Standards show that magnetic speed indicators vary 28 per cent between extreme heat and cold—surely YOU DON'T WANT that kind of an instrument for your car.

THE JONES SPEEDOMETER

New York, 250 West 54th Street
Philadelphia, 1406 Vine Street
Chicago, 1430 Michigan Avenue
Boston, 109 Massachusetts Ave.

SEARCHLIGHT
GAS TANK
"SEARCHLIGHT"
Can Be Had in Every American City and it Has Come to Stay
DON'T FORGET THAT!
WHEN a group of strong men organize a $300,000 company and put their money into it, give it their time, give it the benefit of the best legal, mechanical, engineering and executive talent that large capital and wide experience can secure, they do it in order to build up a permanent business, for the profit there is in it. They don't lie down easily, either.
They expect opposition and are ready for it. As long as they KNOW that they are RIGHT, they don't pay a great deal of attention to hair-splitting legal barriers that competitors may throw in their path. All such "moves" on the business "chess-board" are thoroughly familiar to them and are all provided for in advance, just as a farmer provides himself with a cultivator because he knows that weeds are going to spring up in his land.
SEARCHLIGHT
"The Great White Light"



Follow the Great White Light

SEARCHLIGHT

AND when you see such a body of men investing fortunes in the purchase of raw materials, the erection of a vast chain of plants, the employment of an army of men, you need lose no sleep over the possible consequences to YOU that may follow the purchase of a tank for your own use, or the purchase and sale of tanks, in the capacity of wholesale or retail dealer.

"SEARCHLIGHT" is going to stay because it is a NEW and BETTER system; a system that the whole motoring world has been hoping for and waiting for. Because it gives both dealer and consumer a "SQUARE DEAL" and a "bigger dollar's worth" for every dollar invested.

Searchlight Gas Company

1121 S. Michigan Avenue CHICAGO

BRANCHES AND REFILLING STATIONS:

Boston, Mass.
Canton, Mass.
Camden, N. J.
Buffalo, N. Y.
Warren, O.
Detroit, Mich.
Chicago, Ill.
Kansas City Mo.
Dallas, Tex.
San Antonio, Tex.
San Francisco, Cal.
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VOTE THE COUPON AND MAIL TO US

T. A.

Searchlight Gas Company, 1121 S. Michigan Ave., Chicago.

Please give prices and discounts to Dealers. Send Booklet.

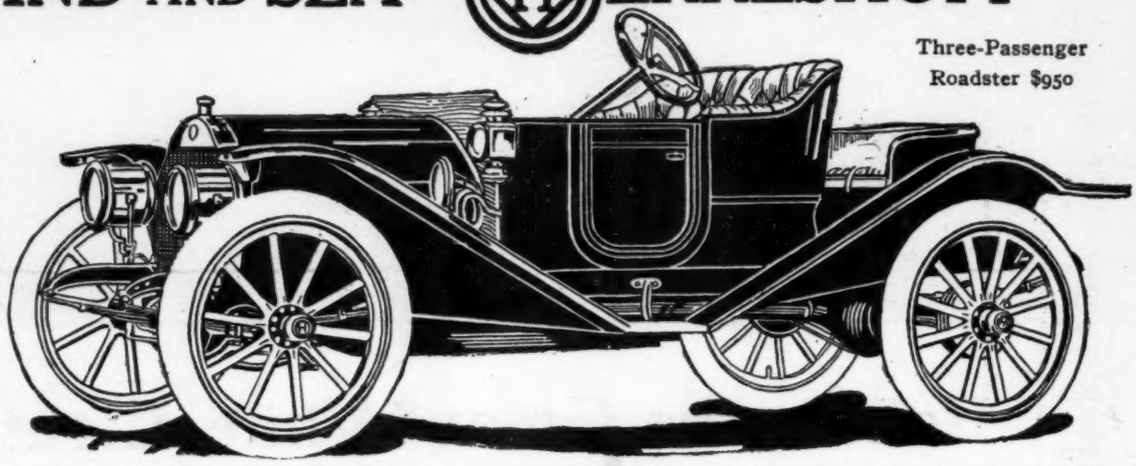
☐ I am a car owner. Give me the name of my nearest dealer and send your Booklet

Name.....
Town.....
State.....

ON LAND AND SEA—HERRESHOFF

Three-Passenger Roadster $950

From the designing of swift sailing yachts, the victories of which, first centered world-wide attention on Charles Frederick Herreshoff, to that of powerful and speedy motor boats, was a befitting step for a man with the Herreshoff individuality and engineering ability. Once imbued with the motor spirit, it was not a far cry from motor boats to motor cars, a step that was consistent, natural and normal.



The genius and inspiration that produced the celebrated Herreshoff marine motor, is again demonstrated in the Herreshoff automobile engine that requires but one gallon of gasoline to take you 25 miles at a rate of 50 miles per hour in the cosy Herreshoff three-passenger roadster, model "25."

The Herreshoff is a blue ribbon automobile thoroughbred—to some it is an object lesson, but to the man who is right now in the market for a refined, high grade motor at a popular price, the Herreshoff "25" fills every distinct requirement. In point of service (the only basis on which to place a value), the Herreshoff "25" will give dollar for dollar more real returns for the money invested than any other car in the American field selling for $1,500 or under. The graceful lines of the fore-door body design; the upholstering; the beautiful finish of Herreshoff Royal Blue with cream running gear, and the general elegance pervading the entire car, denote the exquisite refinement that especially commends this Herreshoff model to the woman passenger.

Every detail has been properly taken care of, even to so fine a point as the unique box-pocket between the two seats that will hold the driver's gloves, goggles, etc., etc. A neat leather cover snaps down over the pocket, out of the driver's elbow way. Specications: 4-cylinder Herreshoff motor, 24 H.P.; left-hand drive; right-hand control, one lever center of car; Bosch high-tension magneto; selective sliding gear transmission, three speeds ahead and reverse; straight line drive; body fitted with irons for top; 32" x 3" tires; 98-inch wheel base; five lamps, including two electric headlights, 60 amp. storage battery.

The 1912 Herreshoff Policy for dealers is not only new original and exclusive, but timely and right. We have need of several more live business men to represent us in selected territory. Write to-day. for Policy and literature.

HERRESHOFF MOTOR CO., General Offices and Factories: 683 Harper Ave., DETROIT, MICH.

STANDARD UNIVERSAL QUICK DETACHABLE DEMOUNTABLE RIM No. 2

The rim illustrated herewith is the very latest development along the line of quick detachable and demountable equipment. The tire rim still affords the excellent advantages of the No. 2 Standard Universal Quick Detachable Rim: reversible side rings (shown above in position for accepting straight side or Dunlop Type Tires) and safe and sure seating of side ring over locking ring which prevents displacement of locking ring. The Demountable Device has been improved upon, and you will now notice the absence of clamping ring or wedges. While not being manufactured commercially as yet, we will be in a position to furnish this rim within a month or two.

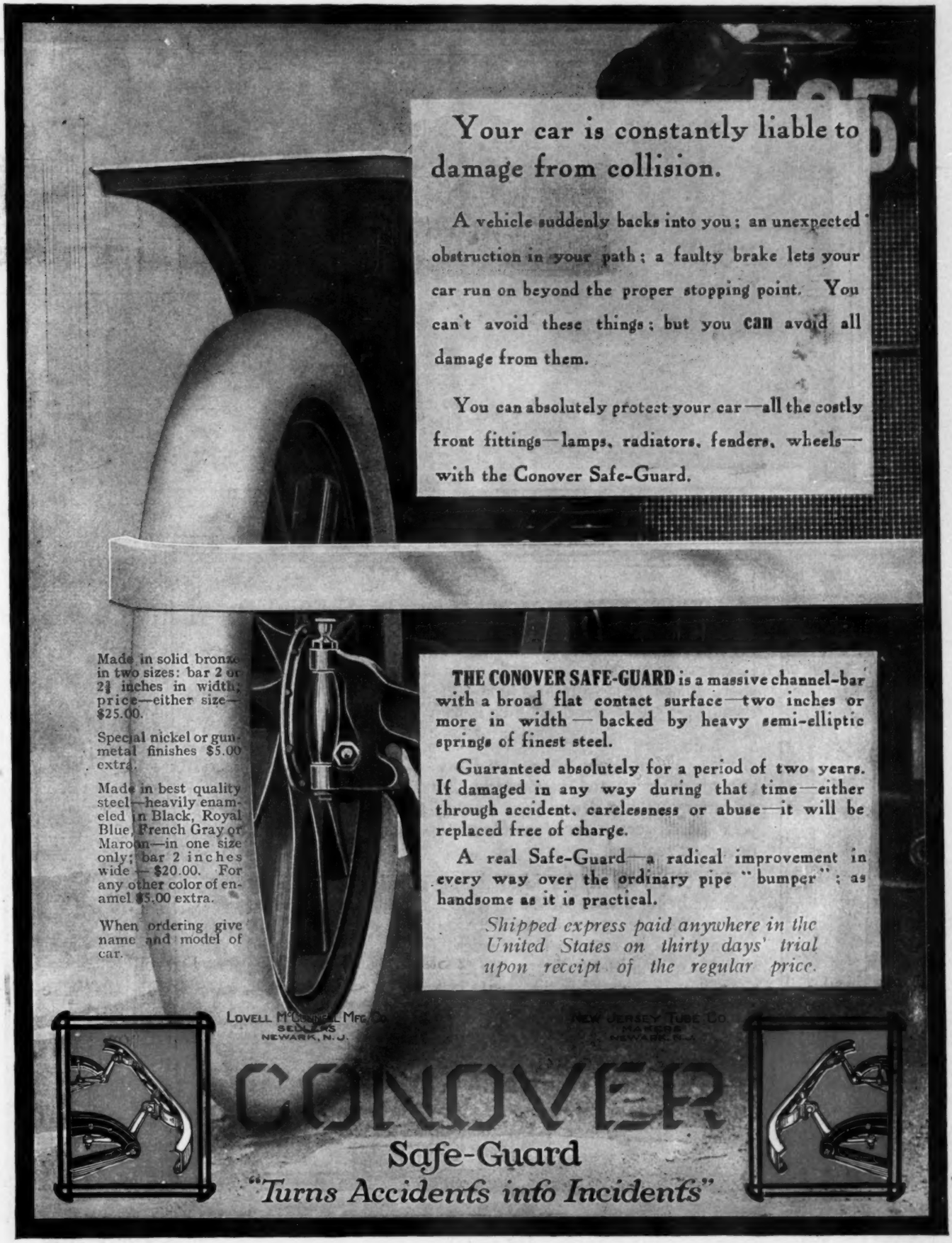
We are co-operating with The United Rim Co., by whom we are licensed to manufacture these rims, toward the end that motor car rim equipment should be standardized.

THE STANDARD WELDING CO.

PIONEER RIM MAKERS

CLEVELAND

CHICAGO DETROIT NEW YORK



Your car is constantly liable to damage from collision.

A vehicle suddenly backs into you; an unexpected obstruction in your path; a faulty brake lets your car run on beyond the proper stopping point. You can't avoid these things; but you **can** avoid all damage from them.

You can absolutely protect your car—all the costly front fittings—lamps, radiators, fenders, wheels—with the Conover Safe-Guard.

Made in solid bronze in two sizes: bar 2 or 2¾ inches in width; price—either size—$25.00.

Special nickel or gun-metal finishes $5.00 extra.

Made in best quality steel—heavily enameled in Black, Royal Blue, French Gray or Maroon—in one size only; bar 2 inches wide—$20.00. For any other color of enamel $5.00 extra.

When ordering give name and model of car.

THE CONOVER SAFE-GUARD is a massive channel-bar with a broad flat contact surface—two inches or more in width—backed by heavy semi-elliptic springs of finest steel.

Guaranteed absolutely for a period of two years. If damaged in any way during that time—either through accident, carelessness or abuse—it will be replaced free of charge.

A real Safe-Guard—a radical improvement in every way over the ordinary pipe "bumper"; as handsome as it is practical.

Shipped express paid anywhere in the United States on thirty days' trial upon receipt of the regular price.

LOVELL McCONNELL MFG. CO.
SELLERS
NEWARK, N.J.

NEW JERSEY TUBE CO.
MAKERS
NEWARK, N.J.

CONOVER

Safe-Guard

"Turns Accidents into Incidents"

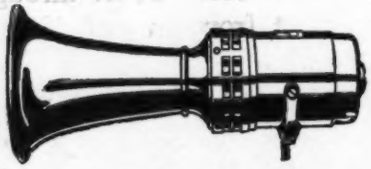
IN THE ADIRONDACKS NEAR SCHROON LAKE

THE TOUR YOU ARE PLANNING

for this summer will surpass, no doubt, the most delightful of former trips. You are studying maps, weighing the claims of shore against mountain, and tuning the car to concert pitch. No detail, you are resolved, shall be lacking to make the brief holiday perfect.

Have you thought about the horn? An effective signal, loud enough to be heard beyond the bend in a mountain road, will add many miles a day to your touring possibilities, and will give your passengers a freedom from mental strain which they have never yet realized.

The SIRENO is the ideal touring signal. Its tone is forceful without being disagreeable; its range is ample for the utmost requirements. Being run by an electric motor, a touch of the button operates it. Its note is independent of throttle and speed, yet variable at will to suit the range desired.



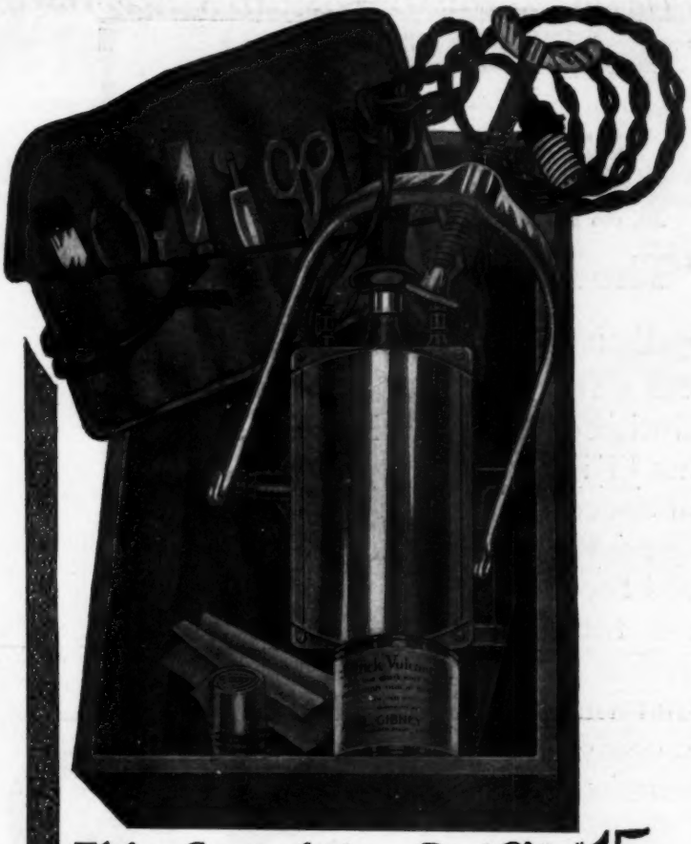
Ask your dealer to show you; and send for artistic catalogue.

Electric Warning Signals and Accessories

THE SIRENO CO

1630 Taylor Bldg. New York

MOTOR



This Complete Outfit $15.

If this Vulcanizer is not part of your equipment then you are not doing your pocket-book or your tires justice.

Remember that ways and means are afforded you by the manufacturer for the care of your power plant, and all other vital parts. He provides you with means to keep them in good shape.

But the tires—the far most important part of your equipment is not provided for—and, you know, that tires are subjected to the greatest wear and tear—much of which is due to carelessness.

The Gibney Eleck-Trick Vulcanizer, applied occasionally to the little defects, cuts, tears and bruises, prevents them from becoming large and destructive. If we charged four times as much for this Vulcanizer it would still be economy on your part to use it.

We positively guarantee that an occasional application of this instrument to the tires, will increase their life at least 33⅓ per cent. You can figure out just what this means in dollars and cents.

Remember you can use the Gibney Eleck-Trick Vulcanizer in your own garage or while on tour—any place where either the direct or alternating current is found.

25,000 car owners indorse the Gibney Eleck-Trick Vulcanizer. They are saving money—so can you. Price of complete outfit including repair kit and materials $15. Order through your dealer or direct from us, and if you want still more information, send for our booklet.

JAMES L. GIBNEY & BRO.

215 N. Broad Street, Philadelphia, Pa.
248-54 West 54th St., New York City

MULFORD AT INDIANAPOLIS

RAYFIELD

"The Better Carburetor"

Better—Because RAYFIELD-equipped cars have proved beyond a scintilla of doubt during the past 20 days that IT is not only the better carburetor for Speed, Power and Economy, but is the most Reliable for every Service. WE entered the racing game this season for the first time—*not for monetary considerations*—but solely to demonstrate to the Motoring Fraternity at Large that the RAYFIELD was the Better Carburetor and would make records—*and continue to do so —because* IT *embodies the advanced practice in carburetion.*

THE RAYFIELD is rapidly replacing all other makes of carburetors—solely, because we rely absolutely upon the MERIT of THE RAYFIELD CARBURETOR to demonstrate ITS superiority over any other system of carburetion.

RAYFIELD

PERUSE AND PONDER—*this our Latest Bulletin*

500-MILE INTERNATIONAL SWEEPSTAKES—Indianapolis Speedway, Memorial Day.

RAYFIELD—Equipped Lozier, driven by Ralph Mulford, finished 2nd, averaging 74.47 m. p. h.; 13 miles per gallon of gasoline.

RAYFIELD—Equipped Knox, driven by Fred Belcher, developed the greatest speed and registered the fastest lap—82.6 m. p. h.

THE ALGONQUIN HILL CLIMB, June 8th.

RAYFIELD—Equipped Case, driven by Joe Jaggersburger, won two events.

RAYFIELD—Equipped Falcar, driven by Morris, won one event.

OMAHA MOTOR SPEEDWAY, June 9th.

RAYFIELD—Equipped Falcar, driven by Pearce, won the 50-mile free-for-all. Also, won the 10-mile.

HAWTHORNE RACE MEET, June 10th.

RAYFIELD — Equipped Case, driven by Jaggersburger, won the 10-mile free-for-all.

BELCHER AT INDIANAPOLIS AND NEW HAVEN

Winners Every Day

A Continuous March of Conquest Has Been the Result of Rayfield-Equipped Cars

CARBURETORS

DETROIT MOTOR BOAT REGATTA, June 10th.

RAYFIELD—Equipped motor boats finished first, second, third, fourth and fifth in the principal event, the winner averaging 38 m. p. h. for 10 miles.

YALE HILL CLIMB, New Haven, June 10th.

RAYFIELD—Equipped Knox, driven by Fred Belcher, won the principal event, defeating the best American and Foreign cars.

MILWAUKEE MOTOR SPEEDWAY, June 20-21.

Special Announcement:

Read Between the Lines.

BOB BURMAN, the "Speed King," adopts the RAYFIELD.

FIRST DAY: RAYFIELD—Equipped Mercedes, driven by Bob Burman, won the 5-mile free-for-all in 04:40.
RAYFIELD—Equipped Falcar, driven by Pearce, finished second in the 10-mile handicap.
RAYFIELD—Equipped Case, driven by Jaggersburger, finished third in the 5-mile non-stock.

SECOND DAY: RAYFIELD—Equipped Mercedes, driven by Bob Burman, defeated the 120 h. p. Benz in the 5-mile special match race.

RAYFIELD—Equipped Falcar, driven by Pearce, won the 10-mile handicap.

RAYFIELD—Equipped Case, driven by Jaggersburger, second in the 5-mile non-stock event.

RAYFIELD—Equipped Case, driven by Jaggersburger, finished second in the 50-mile event.

PEARCE AT OMAHA

MAINE AUTOMOBILE ASSOCIATION HILL CLIMB, June 17.

RAYFIELD—Equipped Knox cars, driven by Fred Belcher and J. J. Coffey, his team mate, finished the day with 4 first prizes out of 9 events. The RAYFIELD—Equipped Knox car driven by Belcher, also won the time prize for the fastest time, regardless of class, establishing a new record of 49.20 sec.

WATCH THE RAYFIELD-EQUIPPED CARS CLEAN UP ALL ALONG THE CIRCUIT.

WATCH THE RAYFIELD become the standard equipment on all makes of cars.

WATCH THE RAYFIELD advancement in the field of carburetion.

AND—LEST YOU FORGET—send for our latest bulletins on RAYFIELD Winners day by day, and Watch the RAYFIELD—the better carburetor.

JAGGERSBERGER AT ALGONQUIN and HAWTHORNE

FINDEISEN & KROPF MFG. CO.

21st AND ROCKWELL STREETS CHICAGO

SALES DEPT., 1312 Michigan Ave, CHICAGO, ILL.

Detroit Branch: 997 Woodward Ave.

Eastern Representatives: SUMMER & DREYFUS CO., 1841 Broadway, New York

DISTRIBUTORS:

National Electrical Supply Co., Washington, D. C.
Waite Auto Supply Co., Providence, R. I.
Coward Auto Supply Co., Boston, Mass.
Western Motor Supply Co., Minneapolis, Minn.
Western Auto Supply Co., Omaha, Neb.
Auto Supply Co., 127 Second St., Milwaukee, Wis.
Oskamp Auto Supply Co., Race and 7th Sts., Cincinnati, Ohio.
Alsten & Goulding Co., Worcester, Mass.
Bernard & Turner, Des Moines, Ia.

The Newtone Motor Horn

A Motor Driven Warning Signal—
Price Complete Including Button and Cable $20.00

PATENTED
April 4, 1911.
No. 988,537

The Newtone produces a deep, penetrating, clear, powerful yet pleasing sound—eliminating all the undesirable features often experienced in other horns of its class.

Among the almost innumerable superior features of **The Newtone,** three stand head and shoulders above the rest—

BEST QUALITY, GREATEST EFFICIENCY, LOWEST PRICE

Quality of workmanship—**quality** of tone—**quality** of material.

Efficiency in Warning—You can hear its musical note a mile away.

Price—While superior in construction, superior in tone and carrying power, the price is from **50%** to **75%** below the cost of any other electric warning signal on the market of its class.

We guarantee satisfaction—otherwise your money refunded. We are the largest manufacturers of automobile horns in the United States, making over 75% of the bulb horns in use.

And our guarantee stands back of every horn we manufacture. If your dealer does not carry it, take no substitute; but let us send you one on approval.

AUTOMOBILE SUPPLY MANUFACTURING CO., 220 Taaffee Plac near DeKalb Ave. BROOKLYN, N. Y.

Prest-O-Tire Tube

TRY IT ONCE—NO MORE FOOT PUMP FOR YOU!

This handy tube inflates an empty tire, or several partially deflated ones, without delay, perspiration or strong language. Simply turn a little valve, releasing the pressure, and the tire is filled.

A life-saver on a hot day!

Tube with valve and hose connection, $3. Extra tubes, $1 each (carry as many as you wish—they're small and easily stored in the tool box). Full tube, in exchange for empty, 20 cents at any of our agents.

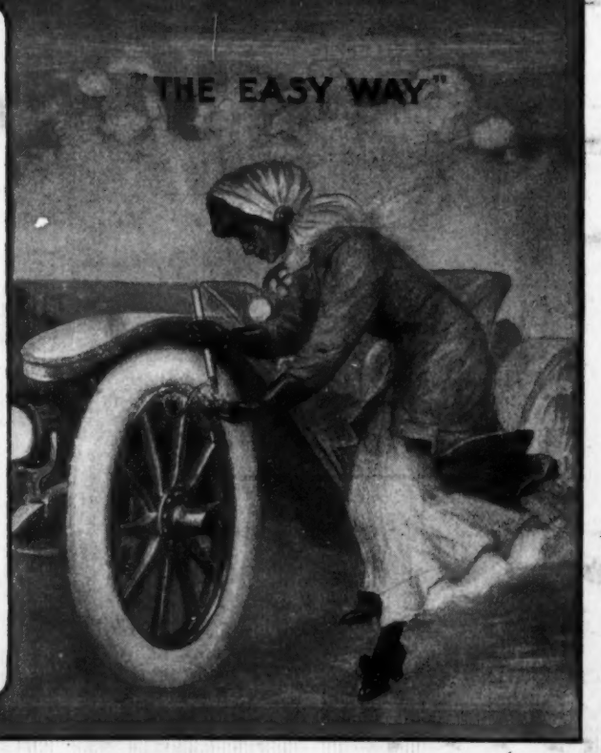
If your tire is bigger than 4 inches, get the larger size of Tire Tube. It costs $1.25, uses the same valve, and can also be exchanged for 20 cents.

PROVE IT Ask your dealer for the outfit — try it thirty days—your money back if you are not satisfied

Each tube comes to you hermetically sealed—no chance for leakage.

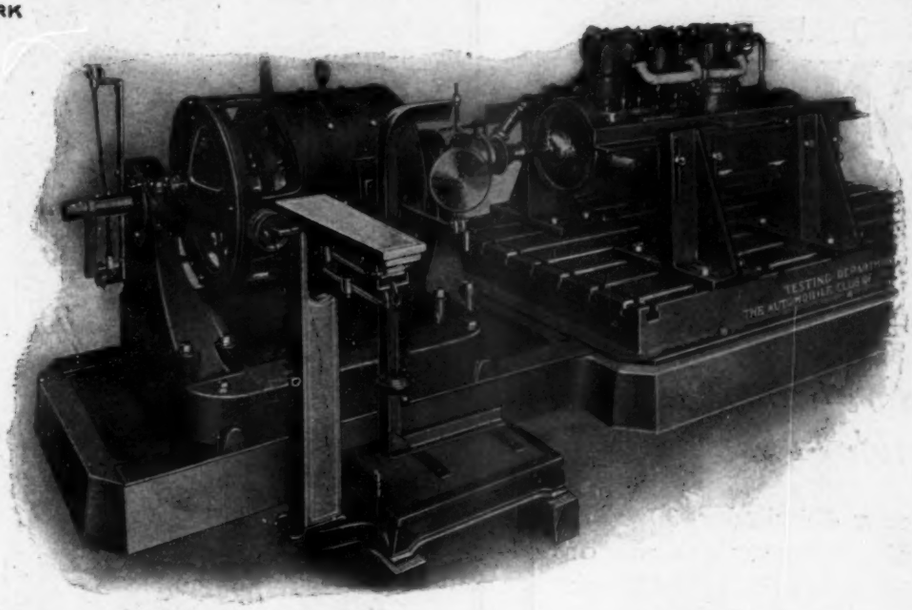
Your dealer has it. If he hasn't ask him to order it for you, or write us

The Prest-O-Lite Co.
234 East South St., Indianapolis, Ind.
EXCHANGE AGENCIES EVERYWHERE



Diehl TRADE MARK

Electric Testing Dynamometers



Diehl Manufacturing Company

ELIZABETHPORT, NEW JERSEY

In next week's issue will appear the announcement of our policy and cars for the season of 1912.

Stevens-Duryea Company
Chicopee Falls, Mass.

Silent Four-Cycle

30 H.P. 4×5½

PANHARD

VALVELESS
(KNIGHT PATENT)

Shaft and Chain Drive

More Silent and Flexible Than a Six

THE new 4 cylinder 30 H.P. Panhard valveless motor (Knight-Patent) can be driven on high gear for both speeding and in congested city traffic.

It is so wonderfully flexible that the car may be driven on fourth speed behind a creeping vehicle or be instantly speeded to a mile-a-minute-pace by a touch on the accelerator pedal.

This motor has no poppet valves and consequently achieves greater silence and flexibility than a six cylinder motor, with fewer parts and complications than a four cylinder poppet valve motor.

Moreover, this new car is backed by the world-wide Panhard reputation for reliability. We want everyone who can do so to take a demonstration in the car. Those who can't should write for advance literature and prices.

Panhard & Levassor

1881-1882 Broadway, N. Y. City

(*N. W. Corner 62d Street*)

Kelly-Springfield

Automobile Tires

The endurance of the Kelly-Springfield Carriage Tire was due to the rubber composition. While the Kelly-Springfield Automobile Tire is a different construction from the Carriage Tire, quality counts just as much there as it did in the Carriage Tire.

I desire to express the perfect satisfaction the two Kelly-Springfield casings you sold me have given. I have now run the tires over 8,000 miles on the rear wheels of the machine, and have had 2,000 miles use out of them since changing them to the front wheels, and they look good for many more miles.—L. E. KINCAID,
Manager, Oakland Fence Construction Co., Oakland, Cal

Specify Kelly-Springfield Tires on your automobile. They cost no more than any first-class tire and are better

CONSOLIDATED RUBBER TIRE COMPANY

20 VESEY STREET, NEW YORK

Branch Offices:
New York, Chicago, Philadelphia, Boston, St. Louis, Detroit, Cincinnati, San Francisco, Los Angeles, Cleveland, Atlanta and Akron, O.

AJAX TIRES

Adjustment Figures That Count

Adjusting with the Ajax-Grieb Rubber Co. on their 5,000 MILE GUARANTEE is done in a systematic manner. On the back of the Guarantee are printed adjusting figures for every 500 miles—A BUYER KNOWS EXACTLY WHAT TO EXPECT. No chance for discrimination by the adjuster.

This would be a great point of advantage if AJAX Tires were only guaranteed for 3,500 miles.

But AJAX Tires are Guaranteed for 5,000 miles—1,500 MILES MORE—and all adjustments are made on this basis—NOTE THE SAVING:

When an adjustment is given on an AJAX Tire which has only run, say 2.500 miles, a new tire is given AT HALF THE LIST PRICE, and a new guarantee goes with the new tire.

Other makers adjust 2,500 miles on a 3,500-mile basis and must consequently charge FIVE-SEVENTHS LIST PRICE for a new tire. The difference amounts to a SAVING of 30% IN TIRE COSTS.

DEALERS should take advantage of these selling points and write for the AJAX Proposition

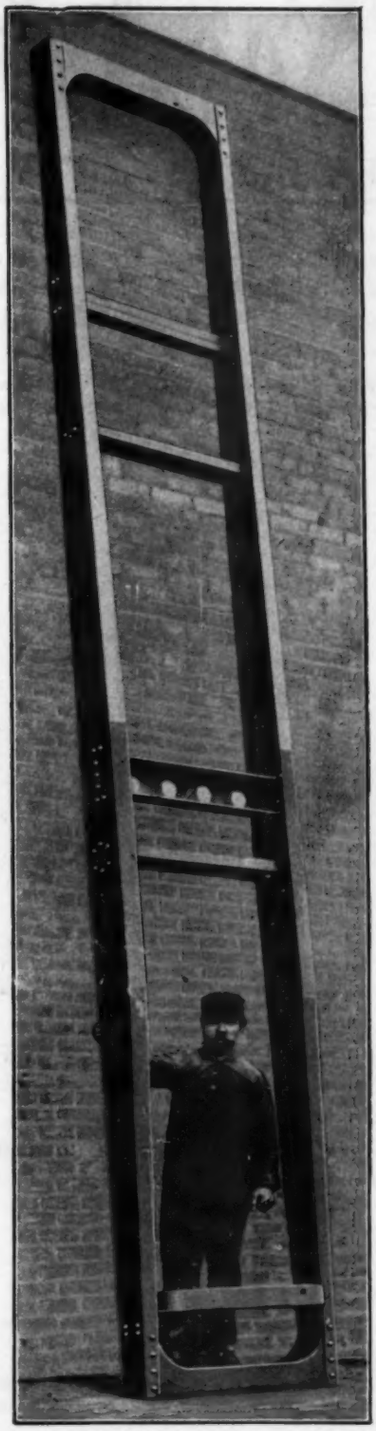
AJAX-GRIEB RUBBER CO.

General Offices: 1796 Broadway, New York City

Factories: TRENTON, N. J.

Branches in Principal Cities

Hydraulic Pressed Steel Co.



TRUCK FRAMES

½ TON TO 10 TON

HYDRAULIC PRESSED STEEL CO.

CLEVELAND, O.

R. B. McMULLEN, General Sales Agent, Chicago, Ill.

Veeder

HUB ODOMETER

A positive mileage recorder. Cannot be tampered with. No gears to unmesh. Cannot remove odometer, since the cap is sealed on, nor can the record be run back by jacking up and running the wheel backward, for the odometer records forward irrespective of the

direction in which the wheel runs. Prevents JOY RIDING and is indispensable for Commercial Cars and Taxicabs.

Price, $25.00, at your dealers, direct from the factory or from the following depots:

T. H. CRANSTON & CO.
56 E. Randolph St., Chicago, Ill.

L. H. & B. I. BILL
543 Golden Gate Ave., San Francisco, Cal.

THE RUBBER TIRE WHEEL CO.
Montreal, Quebec, Toronto, Winnipeg and Vancouver

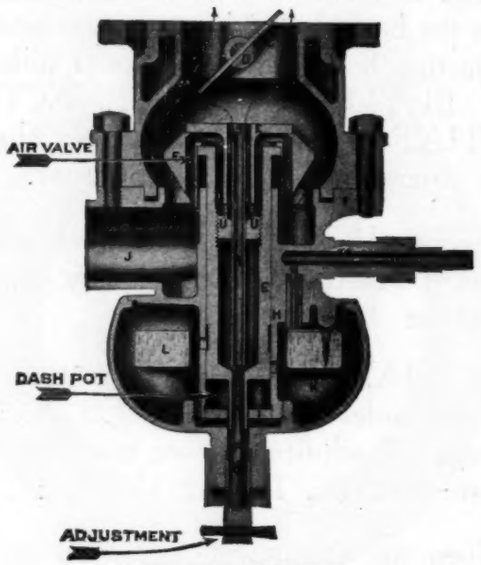
The Veeder Manufacturing Co.
HARTFORD, CONN.

Makers of Cyclometers, Odometers, Tachodometers, Tachometers, Counters, and Small Die Castings.

S. P. C.

THE MAGIC LETTERS OF MOTORDOM
STANDING FOR

STEWART
PRECISION
CARBURETOR



(Sectional View)

RADICAL BUT RIGHT

The history of the development of any industry repeats itself continually.
Radical changes, especially those involving new principles, are fought vigorously by the conservative and looked upon with suspicion by many.
It has always been so.
The STEWART PRECISION CARBURETOR is a radical departure from the faulty and unsatisfactory principle used until now in the carburetor industry.
The **Stewart** is to other carburetors what a high-grade magneto is to the old coil and battery system of ignition.
Be wise NOW and get friendly with this wonderful instrument.
You can tell them, "I told you so," later.

S. P. C. QUINTET
No Other Carburetor Has All

Extreme ***Simplicity*** of Construction
Absolute ***Consistency*** in Operation
Exact ***Metering*** of the Fuel
Perfect ***Atomizing*** of the Fuel
Automatic ***Priming***

IF YOU HAVE CARBURETOR TROUBLES THE STEWART WILL MAKE YOU FORGET THEM

Send for Booklet

MANUFACTURED BY

A. C. Stewart Machine Works
1008 Santee St., Los Angeles, Cal.

Marathon

You never saw a more simple power plant than the Marathon. Increased mechanical efficiency comes only with increased simplicity. That is one reason that Marathon cars give car service, and the Marathon power plant is just as efficient as it is simple and good looking. One of the features which is most prominent in Marathon power plant construction is its oiling system.

Marathon construction forces the oil to do what it is supposed to do—lubricate the parts that need lubrication and not simply lie idle in the crank case—or slop over a lot of places where it does no good. And this is why—

The oiling system is a positive automatic one, without mechanical devices of any kind to assist in the lubricating function. The principle of the system is that of the constant level splash, so designed that it is impossible to run the motor without oiling the bearings. Put oil into the crank case and your lubricating problem is solved.

A reservoir in the bottom of the fly wheel case takes care of overflow by means of an ingenious system of ducts cast integral with the crank case. The oil which is automatically carried into the fly wheel case serves as a constant lubrication for the clutch.

The revolution of the fly wheel picks up the oil in the fly wheel case and carries into a side pocket just above the center, cast integral with the fly wheel case, from which pocket gravity distributes the oil over the various bearings. There is nothing left to chance and nothing about this system that can possibly get out of order. As we said before, the motor cannot run without performing the oiling function. Write us to learn more.

Southern Motor Works

Nashville, Tenn.

12th Ave., N. & N. C. & St. L. Ry.

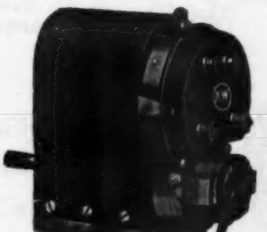
General Offices, 1204 Clinton Street

Not simply a car—but car service

TRADE K-W MARK

High Tension Magneto

Model J
Guaranteed
to Start
Engines
up to 30 H.P.



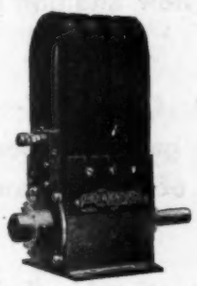
No Coil
No Timer
No Batteries
4 Cyl. $50.00
6 Cyl. 55.00

Absolute synchronism and perfect results at all speeds.

Extremely simple—nearly half less parts than any other Magneto. Perfectly reliable.

We make larger Magnetos for larger engines.

If you cannot gear drive a High Tension Magneto use one of our $35.00 Low Tension belt or friction drive Magnetos and a K-W Spark Coil.



Low Tension.....$35.00
Belt or Friction Drive
Used with K-W Coils
NO Moving Wires
NO Brushes. No Commutator
Runs in ball bearings
Starts engine without batteries and runs electric lights at night

The K-W Spark Coil

4-cylinder $30.00
2-cylinder 18.00
1-cylinder 12.00

Has its winding
Guaranteed Forever
against breakdown

WE PAY THE EXPRESS East of the Mississippi River or to the Mississippi on points beyond on any of our goods, when cash accompanies the order.

No matter what your ignition troubles are we have a guaranteed cure. We also make Low Tension Magnetos and Spark Coils.

Write for Catalogue 16

THE K-W IGNITION Co.
84 POWER AVE. CLEVELAND, OHIO, U.S.A.

FOR SALE BY

New York: A. H. Green & Co., 1686 Broadway
Boston: Mr. W. J. Forbes, 70 Long Wharf
Philadelphia: The Vail-Schaefer Co., 608 Arch St.
San Francisco: Weinstock-Nichols Co., 575 Golden Gate Ave.
Los Angeles: Weinstock-Nichols Co., 1216 S. Olive Street.
Buffalo: J. W. Frey Auto Co., 700 Main Street.
Syracuse: Syracuse Rubber Co.
Portland, Oregon: Rober Machinery Co., 281 East Morrison St.
Kansas City: Kansas City Auto Supply Co.
Omaha: Powell Supply Co.
New Orleans: Interstate Electric Co., Baronne and Perdido Sts.
Cincinnati: L. E. Bedinger, 311 Main St.
Canada: Canadian General Electric Co., Toronto and Branches

Kinwood

What's in a name? *Lots* in this one.

KINWOOD is the family name of the whole list of Kinsey products.

KINWOOD Frames, KINWOOD Hoods, KINWOOD Radiators, are too well known to require any introduction.

But here's a new addition to the family.

KINWOOD GASKET—a sturdy little gasket, splendidly made of copper and asbestos.

Don't delay meeting him; he's well worth knowing.

Ask us to send him to you; look him over critically; subject him to any test, whatsoever; he'll come out with colors flying.

He's made right, as you'll see; and *sold* right, too.

THE KINSEY MFG. CO. KINWOOD AUTO PARTS TOLEDO, OHIO, U.S.A.

Our new Catalogue describes the whole KINWOOD family; send for it.

The Kinsey Mfg. Company

Toledo, Ohio.

In the past two years the Pullman Motor Car Company has lost but TWO dealers, and in neither instance was the Pullman car or the Pullman policy at fault.

There is one cogent reason responsible for this splendid record!

> Dealers who sell Pullman cars sell Good cars at satisfactory profit to those who appreciate their worth.

There is no dealer—no matter how successful he may be—who can afford to stake his reputation in the matter of handling a car of doubtful reputation.

No dealer, who is at present having unsatisfactory business experience, can truthfully place the blame for his failure upon existing business conditions.

The automobile industry was never in a more healthful condition—never before in the history of this industry has there been such a crying demand for GOOD automobiles.

And never before has there been such a universal condemnation accorded cars that develop weakness even before the paint is scratched.

The dealer who sells a good car need never fear that his business will stand still or will go back.

One good car will sell more good cars and the dealer who succeeds in placing a popular and well liked machine in any locality is sure to have more requests for demonstration and more consequent sales.

The Pullman dealers are successful. This is an uncontrovertible fact. They are selling products of known and tested worth—products that have proved over and over every advertised claim made for the Pullman car.

And every Pullman car in the territory represented by the Pullman dealer is a rolling advertisement for that dealer.

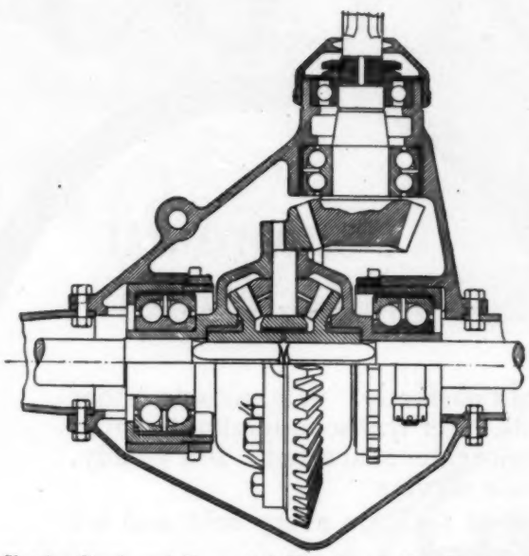
THE RIGHT CAR HELPS SELL ITSELF.

We still have territory open to a few dealers who want to represent a product that has integrity of purpose back of the manufacturer and sterling worth as represented by quality of materials, finished parts and the consequent harmonious whole.

We want to get into communication with such dealers.

Pullman Motor Car Company
York, Pa.

NEW DEPARTURE BALL BEARINGS



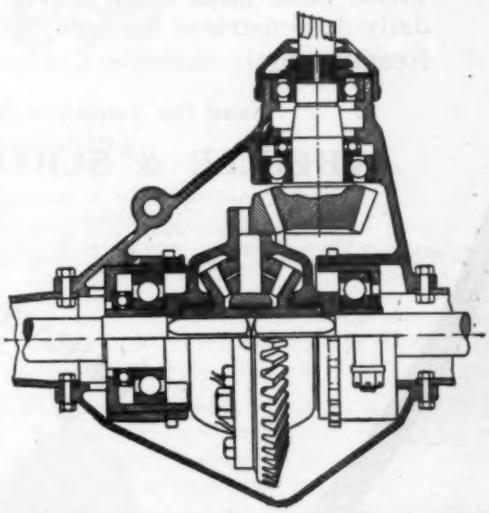
Showing Simple and Economical Mounting of New Departure Double Row Ball Bearings.

The New Departure Double Row or Combined Radial and Thrust Ball Bearing is Superior as a Differential Case Bearing Where Bevel Gears are Used for Driving.

The journals are under constant combined radial and thrust stresses, the angular load being fully 50% of the radial due to the thrust of the bevel gears. This proportion of thrust also exists back of the pinion and at one side of the differential gear casing.

The New Departure Double Row is a self-contained unit which successfully cares for both the radial and thrust strains occurring at these points with large margins of safety and maintains absolute alignment so essential to silent gear operation. And this, too, at a point where duty is severe and failure of the bearing would be serious.

A New Departure single row bearing is used at the front end of the pinion shaft, simply as a steadying bearing. Major loads in all directions are absorbed by the double row bearing.



Showing Mounting of Two Bearing Units With Which It is Difficult to Secure Absolute Alignment.

Send us your blue prints with description of mechanism, also load and speed data and our engineering department will advise you regarding the adaptability of the New Departure to your bearing problems.

The New Departure Mfg. Co., Bristol, Conn.

Western Branch Office, Rooms 1016-17 Ford Building, Detroit, Mich.

SCHEBLER RECORDS

HIGH SPEED RACING RECORD

TRANSCONTINENTAL TOURING RECORD

The Schebler Carburetor is designed and built correctly. It is suitable either for high speed racing with its severe demands. For transcontinental touring, where every road condition and variable temperatures are met. For steady, reliable, economical, day in and day out truck service.

These facts have been proven in hundreds of tests, in every field, and are daily demonstrated by over 400,000 satisfied users.

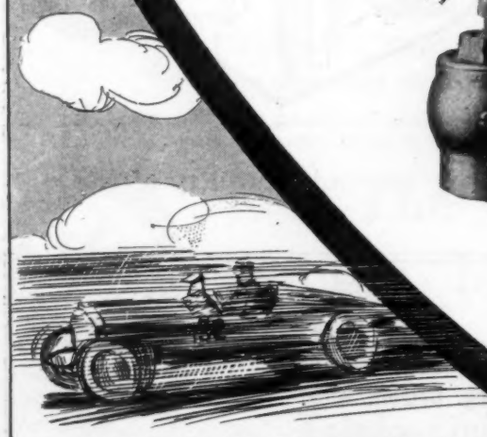
Resnlts count—Schebler Carburetors deliver results.

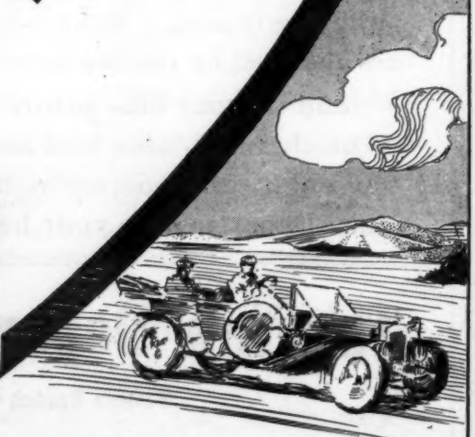
Send for complete information regarding the Model L

WHEELER & SCHEBLER, INDIANAPOLIS, IND.

CHICAGO OFFICE, Mr. N. H. Motsinger, Jr., Manager, 1400 Michigan Ave. DETROIT OFFICE, Mr. John Ryan, Mgr., 876 Woodward Ave. BOSTON OFFICE, Mr. W. J. Connell, Mgr., 555 Boylston St. NEW YORK OFFICE, Mr. E. J. Edmund, Mgr., 1783 Broadway. PACIFIC COAST REPRESENTATIVES, Weinstock-Nichols Company, San Francisco, Los Angeles and Oakland. NORTHWESTERN BRANCH, 12 S. Eighth St., Hollis Electric Co., Minneapolis, Minn.

THE HEART OF THE AUTOMOBILE

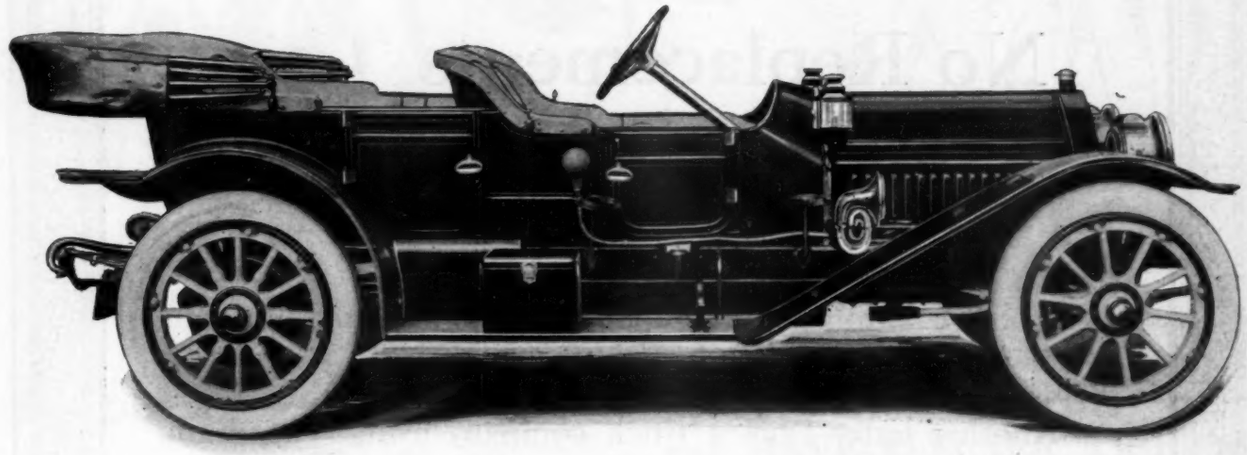




MARMON "WASP" AT INDIANAPOLIS MAINTAINS AVERAGE SPEED OF 74.62 MILES PER HOUR FOR 500 MILES WITH SCHEBLER STOCK CARBURETOR MODEL "L"

WESTGARD ON TRANSCONTINENTAL TOUR COVERS 5,000 MILES ON SCHEBLER EQUIPPED CAR WITHOUT CARBURETOR TROUBLE OF ANY DESCRIPTION

500 Miles at Terrific Speed
Engine Hood Not Lifted Once



30-50 Toy Tonneau $4,300

Amplex

Valveless—Self-Cranking

The most conspicuous performance in the International 500-mile championship race at Indianapolis was that of the Valveless Amplex car.

This car finished well up in the money.

It covered the distance in 7 hours and 15 minutes; or at the amazing average speed of 68.9 miles per hour.

Not once throughout the race was the hood of the engine lifted.

More remarkable still, not a drop of water was put into the radiator after the race started.

The only stops made were for gasoline and oil and tires; and there were only eleven tire changes in a race where the other contestants burned up and blew out thousands of dollars' worth of tires.

The night of the race the car which did these remarkable things was loaded on an express car and shipped to New York.

To-day—without having been in the factory or a shop, mind you, for overhauling or adjustments or repairs—it is running on New York streets.

We entered the Valveless Amplex in the 500-mile race not to demonstrate its speed—though that was admirably done.

We entered it to show the marvelous efficiency and endurance of its valveless engine; the matchless strength and stamina of the car itself.

With one or two notable exceptions, every other car in the race encountered mechanical trouble—sticking and broken valves; strained and broken crankshafts; burned out bearings, etc.

The Valveless Amplex had no trouble; it took no water; it made few tire changes, and at its terrific speed it average 10½ miles per gallon of gasoline.

It was the only car of the valveless type in the race.

To us, this race has served only to clinch more positively, more conclusively, the utter superiority of the Valveless Amplex in the two attributes a man prizes highest in his car—efficiency and endurance.

SIMPLEX MOTOR CAR COMPANY, Dept. A, Mishawaka, Ind.

No Replacements This Year Where Vanadium Steel Was Used

A large automobile company writes this statement in reference to transmission gears, drive shafts and axles made of Vanadium Steel used in their car.

Another letter from a truck company using Vanadium Crucible Steel Castings, says:

"We have never had a failure in service."

A third letter on Vanadium Steel Forgings and bars for automobiles, reads:

"The steel is splendid; we have the highest opinion of it; it does not crystallize under vibration and is exceedingly strong."

A fourth says of Vanadium: "Best results we have obtained from any steel."

A fifth: "We have been using Type 'A' Vanadium Steel about 18 months and have obtained excellent service."

Sixth: "Physical properties very good, especially excellent under dynamic stresses. Splendid service in valve springs, etc.

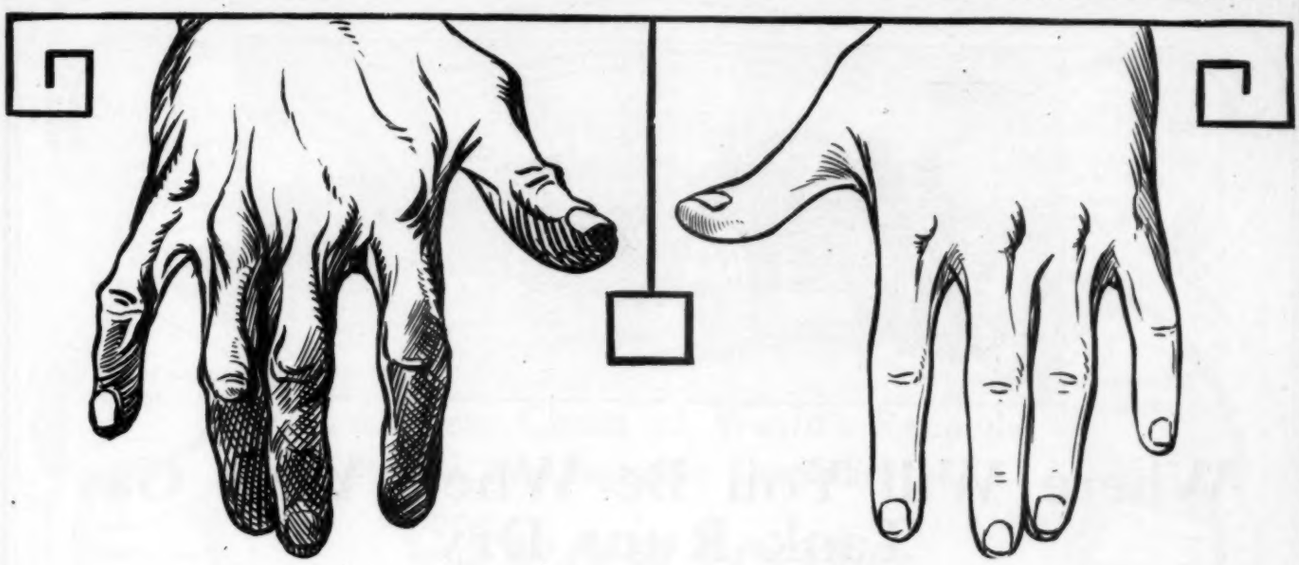
Properly made, properly heat treated and properly placed with reference to type of steel for class of service, Vanadium Steel leads the world.

Send for booklet on various types, uses and heat treatment of Vanadium Steel.

AMERICAN VANADIUM COMPANY

Miners of Vanadium Ores
Largest Producers of Vanadium Alloys in the World

310 Frick Building **PITTSBURGH, PENNA.**



Fingers that light
OIL AND GAS LIGHTS
with matches

Fingers that
PUSH A BUTTON
and HAVE ELECTRIC LIGHTS

WHICH HAND IS YOURS?

ELECTRIC LIGHTS
ARE CLEAN

USE THE

E.L.B.A.

ELECTRIC LIGHTING BATTERY

Specify Electric Lights On Your New Car

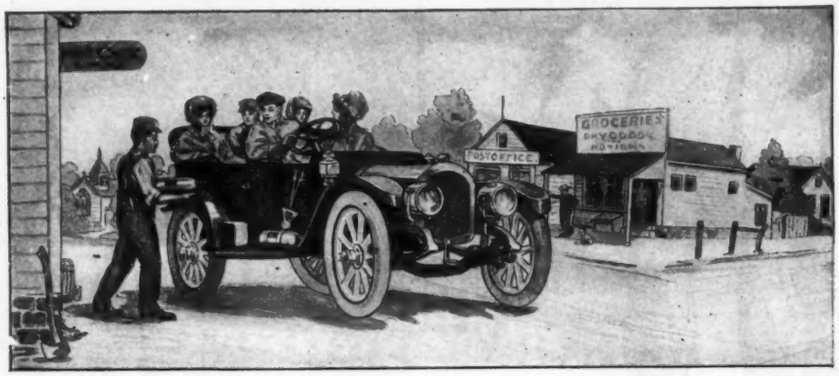
Write for BULLETIN No. 39

WILLARD STORAGE BATTERY COMPANY **CLEVELAND, OHIO**

NEW YORK
136 West 52d Street

DETROIT
1191 Woodward Avenue

CHICAGO
436 So. Dearborn Street



Where Will You Be When Your Gas Tank Runs Dry?

This is a serious matter, if you have a tank not backed by a widespread exchange service. Any man who has found himself 30 miles from a city as night settled down, with an empty tank that could not be exchanged, will advise you not to buy such a tank.
But the Prest-O-Lite user knows no such trouble.

PREST-O-LITE GAS TANKS

When Empty, Can Be Readily Exchanged ANYWHERE AND ALWAYS

There are Prest-O-Lite Exchange Agencies in all cities, and in nearly every town and small village in the United States.
No imitation has, or ever has had, a dependable exchange service.
Be careful to see that no such tank is put on your car in exchange for your empty Prest-O-Lite, either through open persuasion or secret substitution.
Prest-O-Lite has had dozens of imitators. One by one they have gone out of business. Here are the reasons:

1st: Not one of them ever made good the claims of "more gas" or "bett r gas" than Prest-O-Lite.

2nd: Not one of them ever furnished a reliable, widespread exchange ervice.

3d: Not one of them ever at sfied its customers or attracted enough customers to enable it o stay in the gas tank business.

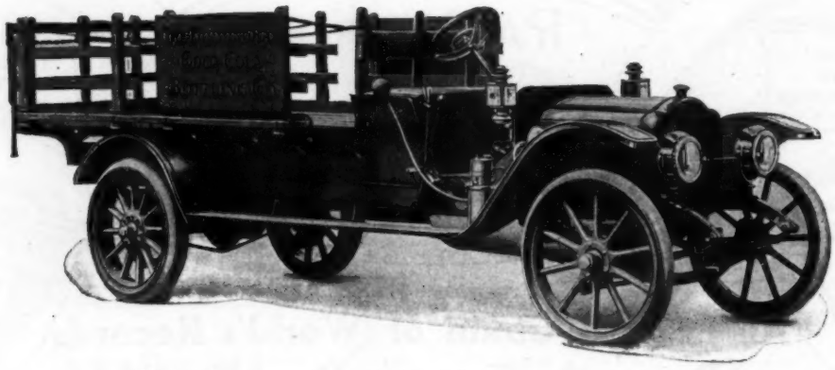
Every one of these imitators, on quitting the business, left the dealer and his customers "holding the sack" with tanks that could neither be sold nor refilled.
Don't gamble on what any imitator promises, claims, or hopes to do. The lesson of the past is eloquent. Let the imitator experiment with his own money, not with yours.

The Prest-O-Lite Co. 234 East South Street INDIANAPOLIS, IND.

BRANCHES AT—Atlanta, Baltimore, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Jacksonville, Kansas City, Los Angeles, Milwaukee, Minneapolis, New York, Omaha, Philadelphia, Pittsburg, Providence, St. Louis, St. Paul, San Francisco, Seattle.
CHARGING PLANTS—Atlanta, Cleveland, Dallas, E. Cambridge. Hawthorne, Indianapolis, Long Island City, Los Angeles, Oakland, Omaha and Seattle.
FOREIGN AGENCIES—Honolulu, H. I.; Manila, P. I.; San Juan, P. R.; Toronto, Can.; Vancouver, B. C.; Havana, Cuba; City of Mexico; London, Eng.; Berlin, Germany.

EXCHANGE AGENCIES EVERYWHERE

"Firestone"
BARNEY OLDFIELD
Milwaukee
Sept. 27.10
MILE TRACK. 15 MILES
70.92 Mi. Pr. Hr.
RAY HARROUN
DRIVING MARMON
Indianapolis 500-Mile Battle of Tires
May 30.1911
74.59 Miles Per Hour
LOUIS DISBROW
Jacksonville
Mch. 31. 11
300 MILES
77.25 Mi. Pr. Hr.
TRACK 20 MILES
65.75 Mi. Pr. Hr.
250 MILES
76.95 Mi. Pr. Hr.
An Endless Chain of World's Records
Proves the Supreme Durability of
"Firestone"
TIRES
TRACK 25 MILES
65.83 Mi. Pr. Hr.
200 MILES
77.82 Mi. Pr. Hr.
TRACK 50 MILES
62.10 Mi. Pr. Hr.
150 MILES
78.06 Mi. Pr. Hr.
Three of the original Firestone regular stock tires that carried Ray Harroun's Marmon car to victory at Indianopolis, May 30th, remained on the car untouched, in perfect condition at the finish.
This greatest battle of tires the world has ever known was won on the superior service given by Firestone tires —500 miles of grinding wear and strain at the terrific speed of 74.59 miles per hour, on an oval course.
This forges the strongest and most important link in a chain of world's records for tire durability, which proves that
Firestone Tires Belong on Your Car
LEN ZENGLE
Fairmount Park
Oct. 8. 10
ROAD RACE
202.5 MILES
58.09 M.P.H.
EDDIE HEARNE
Indianapolis
July 4. 10
SPEEDWAY
20 MILES
85.03 Mi. P. Hr.
20 MILES
90.90 Mi. Pr. Hr.
SPEEDWAY 15 Mi.
86.37 Mi. Pr. Hr.
It is the General Belief that All Tires Used in Racing are Special Made.
We do not make special racing tires.
Ask the Nordyke & Marmon Co. and they will tell you they bought these tires in the regular way through our Chicago branch, without our knowledge that they were intended for racing.
You can get Firestone tires made just like these from any dealer
50 MILES
83.42 Mi. Pr. Hr.
STANDING START MILE
68.82 Mi. Pr. Hr.
The Firestone Tire & Rubber Co., Akron, O.
"America's Largest Exclusive Tire and Rim Makers"
Branches, Agencies and Dealers Everywhere
SPEEDWAY MILE
101.83 Mi. Pr. Hr.
ONE HOUR
81.65 MILES
BOB BURMAN - DAYTONA APRIL 23
ONE MILE 25.40 secs.
141.73 Miles Per Hour
Fastest Traveled by Man
KILOMETER
140.86 Mi. Pr. Hr.
TWO MILES
140.40 Mi. Pr. Hr.



Possibilities of Motor Trucks Unlimited

There is practically no limit to the possibilities of motor-trucks in the business world. Every man who has a cartage problem is anxious to know just how motor-trucks will work out under his conditions. But the question is solved—The White Company have hundreds of trucks in operation in almost every conceivable kind of business—under practically every known condition, and there is not a single owner to whom we could not refer you as a prospective buyer. Not one has been disappointed, but on the contrary has found that the White truck has exceeded his expectations.

Increased Service White trucks serve their owners, first of all, through increased service. They make it possible to do things you have never done before—to secure trade you were unable to reach—to be prompt where you were compelled to be dilatory before—to increase your service and thereby increase your business.

Increased Economy Under the majority of conditions, White trucks increase the economy of your delivery—not always—there are conditions where trucks only increase the service. The truck replaces two or three teams—is not as expensive to maintain as two teams and requires no more men to operate than one team—saving salaries.

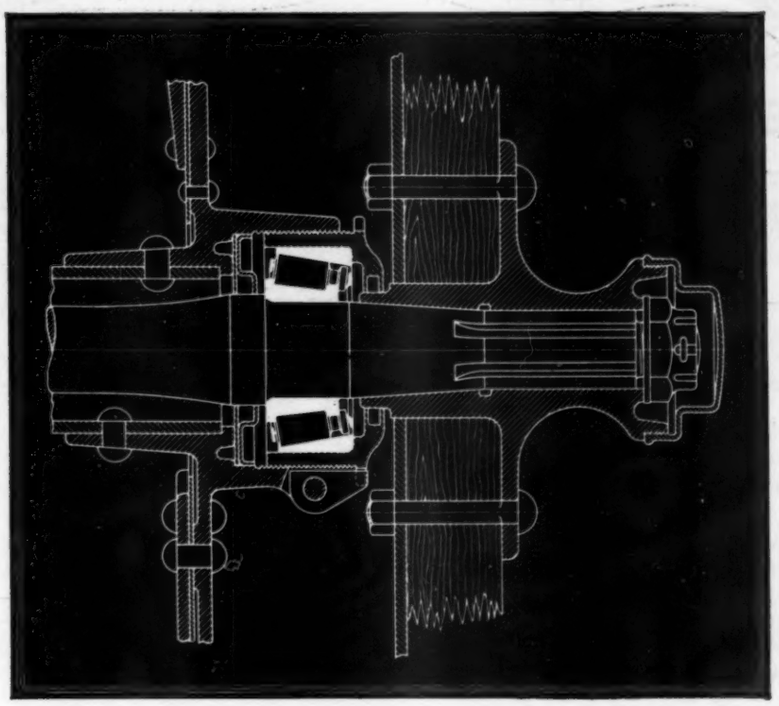
White Truck—The Solution

White trucks solve your delivery problems, by increasing your service or increasing the economy of your service, or both, because they are well designed for economy's sake, having the long-stroke, medium bore engine, which is powerful but economical. They are built for economy's sake because we use the best materials modern science has produced—the special alloys of steel, heat-treated, which are best suited to the various purposes to which they are put. White trucks are made in three sizes, with engine standardized in all types, to simplify the mechanical problem, and make White Trucks adaptable to any business, any special or unusual requirements.

Let us submit a solution of your delivery problem with catalogue and testimonials of the world's largest users.

The White Company

800 EAST 79th STREET, CLEVELAND



TIMKEN ROLLER BEARINGS

In Touring Car Rear Hubs

Rear axle design, generally known as fixed hub type, is popular with many designers, particularly for light cars.

The above cut shows this construction with TIMKEN ROLLER BEARINGS in which they have proven to be especially efficient.

We have previously shown applicaticns in
Light touring car front hub (Malleable).
Heavy touring car front hub (Malleable).
Touring car front hub (Pressed Steel).

If interested send for line drawing.

THE TIMKEN ROLLER BEARING CO.

CANTON, OHIO

The Motorists of this Country are now buying three

United States Tires

Continental
G & J

Hartford
Morgan & Wright

For every two they buy of any other make or brand

Which means that United States Dealers are getting the "lion's share" of the tire business *profits.*

The best dealers of the country recognize this. Four-fifths of them have already lined up with us.

And United States Tires are not only the *fastest* selling tires but also the *easiest* selling tires in the world today.

Motorists everywhere are demanding them.

We have told them the advantages to be gained by using United States Tires through the largest advertising campaign ever attempted by a tire maker.

We have backed up these claims by giving them

The Strongest Tires in the World

Moreover, dealers recognize that the United States Tire business is a permanent and *growing* business—the kind of a business they are ambitious to build up.

The certain future of United States Tires appeals to them.

We have every reason to believe that the tremendous sales our dealers are now enjoying is largely due to the fact that rarely does a motorist change to another brand once he has used United States Tires.

A United States dealer doesn't have to spend a lot of valuable time making excuses for poor service

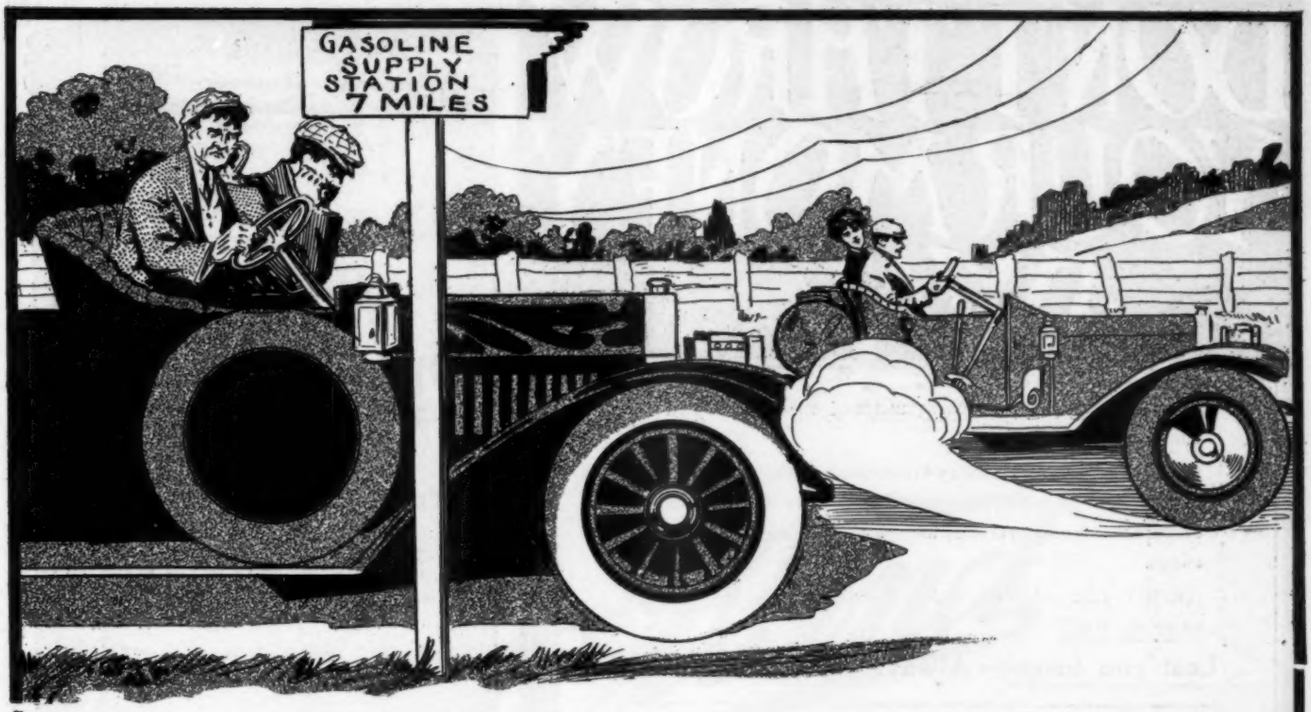
The tires themselves back up his strongest recommendation to the limit and bring the buyer back to his store for more.

United States Tires

ARE

America's Predominant Tires

United States Tire Company
Broadway at 58th Street
New York, N. Y.



IT scarcely needs remarking that the motorists who are "on their way" in the above illustration have a Smith Gasolene Meter on their car. Nor does it require any emphasis by word to show that the ones standing still are not driving with a Smith Gasolene Meter on their car.

To those who have experienced the sensation of running out of gasolene seven miles from the nearest supply station the warning in the picture is sufficient. To those who have never been caught in this predicament a word of warning—your turn may come any day. Not alone because you were careless, and did not look at your gasolene tank in the morning, but because your gasolene line may spring a leak any time, and while you are motoring along gaily you are rapidly losing gasolene that is not being consumed by your motor.

The Smith Gasolene Meter is an actual necessity, which keeps before you all the time the exact condition of the gas in your tank. You don't have to guess at it—you don't have to open up your tank and look at it, you simply look at the meter on your dash and you know exactly where you stand every minute. This convenience alone is worth the price of the meter, but the meter will actually pay for itself.

What means have you of telling whether the garage man is short measuring you half a gallon out of every five you are buying if you don't have a Smith Gasolene Meter on your car? Absolutely none.

Put a Smith Gasolene Meter on your car and when you buy five gallons you get it. Put a Smith Gasolene Meter on your car and if somebody takes three or four gallons out of your tank during the night your Smith Gasolene Meter will tell you.

Smith Gasolene Meter

You Never Miss the Gas Until the Tank Runs Dry

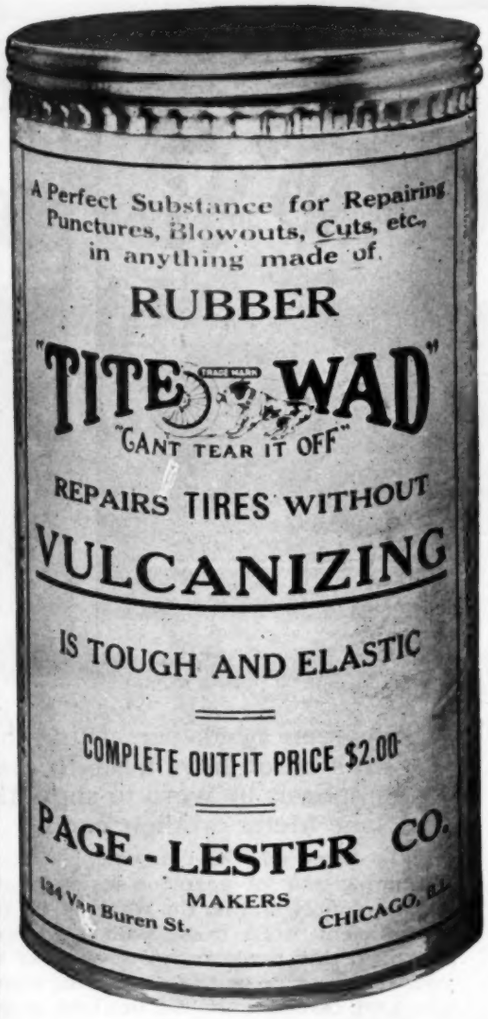
Remember that the Smith Gasolene Meter is no toy or makeshift accessory—it is a scientifically designed instrument. Accurate in the extreme, made out of the best materials that money can buy, and built to last. It is fully guaranteed for two years, and sold under a 30 days' trial with satisfaction guaranteed.

The Smith Gasolene Meter can be installed upon any car, whether it is gravity feed or force feed. The dial is directly in connection with a float in the gas tank. This float is held within the confines of what is called a surge tube, in which the gasolene is the same level as the gasolene in the balance of the tank all the time. This tube simply prevents fluctuations of the meter, owing to the swishing about of the gasolene.

You will save enough money in one season's touring to pay for this meter. For further information write us.

SMITH GASOLENE METER, 1777 Broadway New York City

DON'T THROW YOUR MONEY AWAY



DON'T throw away your punctured tubes or blown out casings.

DON'T find yourself away from home without some means of repairing your tires—because tires have been known to puncture and you have been known to forget extra tubes and casings.

DON'T you find it expensive to run home on your deflated tire or the Rim?

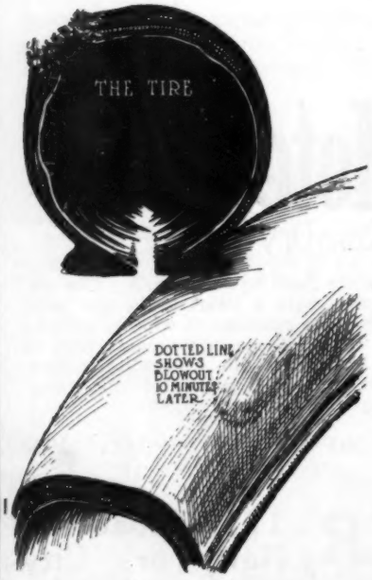
Lest you forget—Always carry a supply of

"TITE-WAD" TRADE MARK
"CAN'T TEAR IT OFF"

The Original Rubber Putty

Repairs cuts, tears, sand pockets, blow-outs, PUNCTURES, etc., in tubes or casings, To stay fixed.

TITE-WAD is a tenacious rubber compound of excellent elasticity, unaffected by extremes of temperature, easy of application and requiring no vulcanizing or other treatment to be complete.



TITE-WAD is sold under an absolute guarantee to give satisfaction.

Money Back If Not Pleased

With a "TITE-WAD" outfit in your car—you are always protected against a ride home on the RIM, when you have forgotten that extra inner tube.

We have plenty of letters not only expressing pleasure but calling for more.

Each outfit of TITE-WAD contains:

1 can of TITE-WAD, THE RUBBER PUTTY.
1 can of TITE-WAD Cement.
1 can of TITE-WAD Pure Mica, Powdered.
1 Reinforced Blowout Patch, Emery Cloth, etc.

Enough in each outfit to repair 50 punctures.

Sold everywhere by dealers, or direct from the factory prepaid on receipt of price, $2.00.

The Page-Lester Co., Makers
125 W. Van Buren St., Chicago, Ill.

STOP, LOOK AND LISTEN

Any automobile dealer who contracts for any line of cars before seeing what

Overland

has to offer, handicaps his business for the coming season. Don't you make a move till you see what we have to offer. The Overland line for 1912 comprises some extraordinary values.

The Willys Overland Company
Toledo, Ohio

Long

Louis Strang Says:

"The best radiator I have ever seen. It showed no signs of leakage after the finish of this hard run; it kept the car perfectly cool at speeds in excess of 75 miles an hour.

"The Case cars, as you doubtless know, won the only two events they were entered in at the Algonquin Hill Climb. In event No. 3-C there were three Case cars entered. Jaggersberger won this event in the remarkable fast time of 48 and 3/5 seconds. Strang finished second and Jones third, all driving Case cars. These were the only Case cars entered in this event.

"Jaggersberger's time of 48 and 3/5 seconds was the third fastest of the day, and was only headed by two other cars, which raced in the big free for all class—one of these cars being a 120-H.P. Benz.

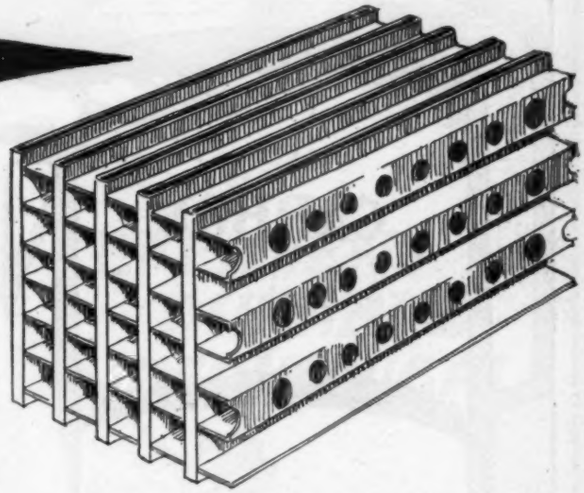
"The other event the Case entered was event No. 3-E, Jaggersberger winning first, Strang finished second, beating a field of nine cars. Only two Cases were entered in this event, and they finished, as I have above stated, first and second.

"All of the Case racing cars are equipped with Long Radiators, hence the reason of writing this letter."

WHY LONG RADIATORS COOL BEST

Long

Radiators



Note the Way the Cellular Type is Constructed

WHAT LONG RADIATORS are doing for the Case Cars, they can do for any other make

EVERY LONG RADIATOR is constructed to meet some particular demand. The Case Company wanted Racing Car Radiators, and Mr. Strang's letter expresses complete satisfaction.

We could print hundreds of letters, expressing satisfaction in every other possible line in which the Automobile is used —Pleasure Cars, Commercial Cars ***and everywhere efficient cooling.***

Where LONG RADIATORS are superior to others, is in their fundamental principles—that's the theory part of it, and in their construction—that's the practical side. The Long Radiators all have straight tubes with clean, straight, open spaces for free water circulation. They all have extensive cooling fin constructions that give maximum cooling surfaces. They are all so constructed that leaks are next to impossible, because the solder joints are in very few places forced to hold water.

LONG RADIATORS have for ten years been used in larger and larger numbers on Pleasure and Commercial Cars.

Manufacturers of Motor Cars who have used them longest are the most persistent users.

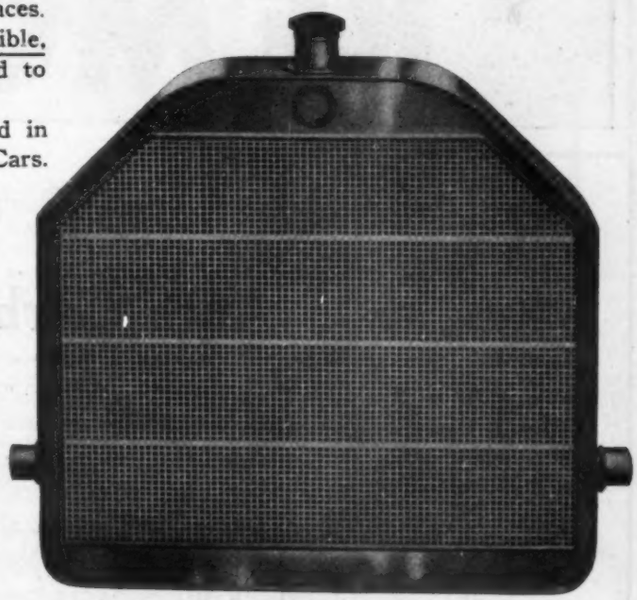
Those who have driven cars equipped with them and other makes would have only the LONG patented types.

WHETHER on pleasure or commercial cars, the LONG kind of radiator with the LONG construction and with the LONG kind of workmanship, gives such perfect and universal satisfaction that they have been adopted by many of those who have for years used other makes.

LONG RADIATORS, once used, are never discarded.

LONG RADIATORS have exceptional cooling properties, exceptionally long life and never go "dry" for they never leak.

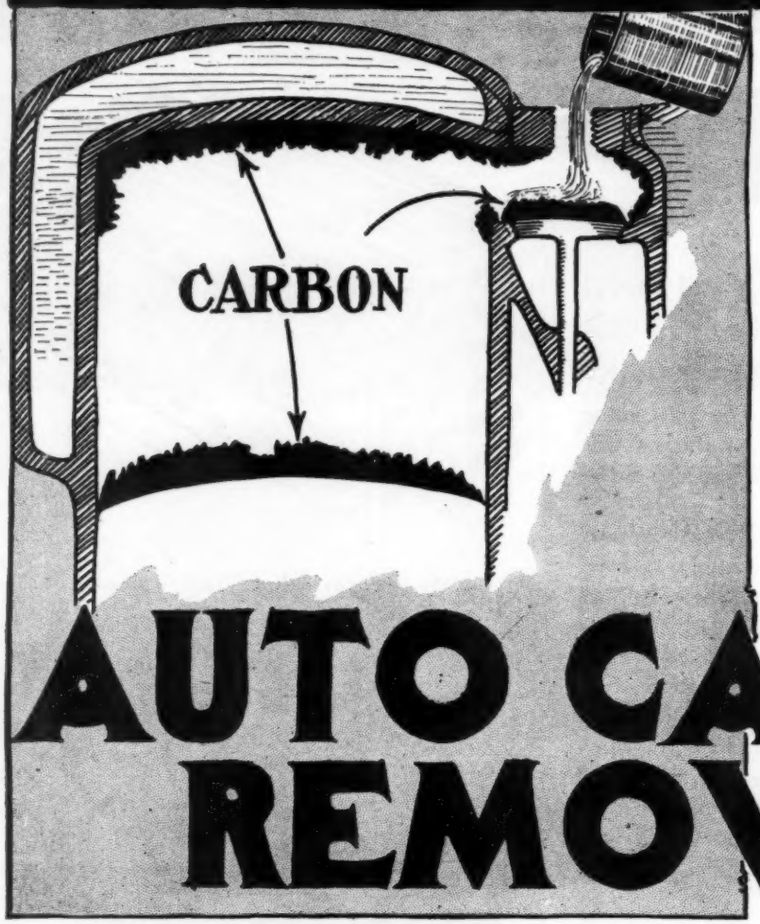
Let us send you our literature



One of the Cellular Long Radiators

Long Manufacturing Company
1283-1315 Cass Avenue Detroit, Michigan

Carbon is *the* Motorist's worst Enemy



It fills up the valve chambers, strangling the supply.

It causes heating and preignition.

It coats the piston and cylinder walls, ruining compression. In fact, it makes an occasional overhauling absolutely necessary — THAT IS, IT DID

BUT NOW

AUTO CARBON REMOVER

makes all that old, laborious process of dismantling and scraping unnecessary. The motorist has now but to say

Auto Carbon Remover

to the supply man and for the sum of 85c gets enough of this wonderful, labor-saving remedy to entirely remove the carbon from all of his cylinders twice.

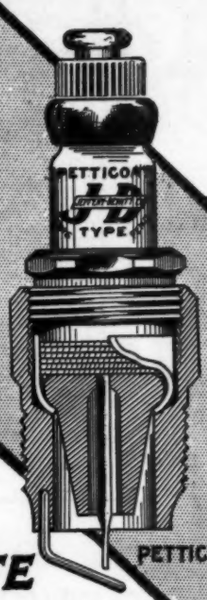
We give complete directions for use, so that the most inexperienced can successfully and without discomfort make his cylinders as "clean as a whistle" and rest assured that they are in better condition than when the repairman charged him $25.00 for the job and had his car several days out of commission.

Don't take injurious substitutes from your dealer if he hasn't it. Send to us direct. 85c per quart.

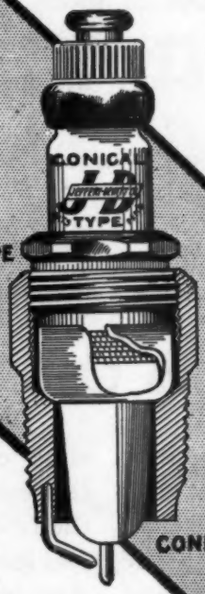
WHITNEY CHEMICAL COMPANY

6122 Euclid Avenue **CLEVELAND, OHIO**

75¢



PETTICOAT TYPE



CONICAL TYPE

CLOSED END TYPE

EFFICIENT
DURABLE
ECONOMICAL

A COMPLETE LINE OF

J-D
JEFFERY-DEWITT CO.
Detroit, Mich.

SPARK PLUGS

The "J-D" Plug is not a "competitive" plug nor a makeshift. It is a high grade spark plug of the very finest quality. No matter how much more you pay you won't and can't get any finer quality materials or workmanship. And no plug in the world excels the "J-D" except one—the famous "Reliance."

The only difference between the "J-D" and the "Reliance" is the patented electrical action of the "Reliance" which costs more to produce. The "J D" Plug is standard in construction and type. It is not an assembled Plug—every part is made in our own large, exclusive Spark Plug Factory under the most rigid inspection system extant.

Manufacturers who use "J D" Plugs as standard equipment do so because exhaustive tests prove all our claims for high efficiency and high quality.

Each "J-D" Plug is unqualifiedly guaranteed to be absolutely perfect—the porcelain, the shell, the caps, the nuts, etc. And each Plug is ELECTRICALLY tested—there must be no undue resistance that would tend to harm the coil or magneto, and the spark must be of the proper intensity—no "weak," scattering sparks get past inspection. We can afford to be exacting because we manufacture every part—THAT'S WHY EVERY 'J-D" PLUG "MAKES GOOD."

Porcelains and Plugs fully guaranteed.

Note this: Porcelains used in all plugs of our manufacture will stand 50 to 100% greater voltage than that used by any other manufacturer. We make our own porcelain—make it for one use only—SPARK PLUGS—that's why.

Our guarantee reads this way: "IF ANY PLUG OF OUR MANUFACTURE DOES NOT SATISFY, BRING IT BACK AND GET ANOTHER PLUG OR YOUR MONEY BACK." Every dealer is authorized to live up to this.

"J-D" Plugs are sold by first class dealers and jobbers everywhere. If your dealer can't supply we will send plugs prepaid for 75c each.

JEFFERY-DEWITT COMPANY, LARGEST SPARK PLUG MANUFACTURERS IN THE WORLD

51 BUTLER AVE, DETROIT, MICH.

ARMAND FREY & CO., Agents for Continental Europe, Berlin, Germany

Which Horseshoe Will Cool First—

The One on the Ice or the One in the Ice Box?

Doesn't require much theory or technical knowledge to know that the horseshoe lying on the cake of ice will cool infinitely faster than the one in the ice box. This is true even though the ice box may be as cold or colder than the ice itself (colder, if a salt solution be used to cool the box).

This example illustrates perfectly the difference between a radiator that cools by direct contact with the cool air or one that cools indirectly thru a lot of indirect fin surface.

Livingston Radiators Cool by Direct Contact

That is, every drop of water in the radiator is constantly being brought into contact with thin sheets of cool paper-thin metal. Not only this but in Livingston Radiators the thin sheets of water flowing constantly and uniformly between thin sheets of cool metal are in contact with the cooling surface twice as long as in the ordinary radiator. This is true because the columns of water which flow thru the uniform perpendicular and lateral corrugated passages are twice as long as in most radiators and much longer than in any radiator. In other words, the efficiency of Livingston radiators compared with all others is represented by the horseshoe example above. The one on the ice represents Livingston cooling efficiency—the one in the ice box represents the cooling efficiency of other radiators.

And while on the subject of ice it is well to emphasize the fact again that Livingston radiators are the only ones in the world that can be frozen solid without danger of splitting the tubes.

Livingston radiators are stronger than other radiators because their construction admits of the absorption of road shocks thru their flexibility. You never hear of a Livingston radiator springing a leak unless some foreign substance punches a hole thru it.

Livingston Radiator & Mfg. Co.

52d Street and 7th Avenue **NEW YORK CITY**

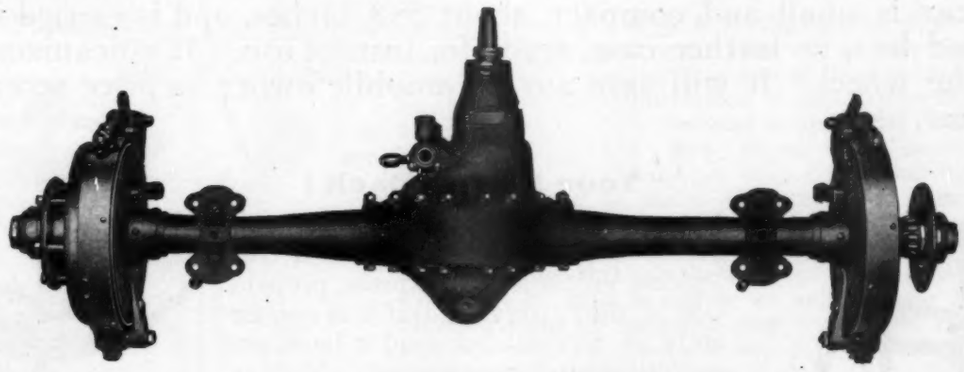
Nothing hurts your engine like inefficient cooling. We make individual radiators for car owners. Before it is too late write us if your radiator boils and we'll show you how to save your engine. Be sure to get a Livingston Radiator on your new car. If your maker doesn't furnish it write us and we'll tell you how to get one.

Chapters on Quality

Chapter Eighteen

The preponderance of Timken-Detroit Axles on cars of high quality construction has led to the almost universal belief that Timken-Detroit Axles are the unfailing sign of a good car.

The list of users of Timken-Detroit Quality Axles points unmistakably to this conclusion. The manufacturer building his chassis on the best axles money can buy is evincing a desire for stability that means permanency by reason of quality.



Fitted exclusively with Timken Roller Bearings.

The Timken-Detroit Axle Co.
Detroit, U. S. A.

Vulcar
THE NEW PROCESS VULCANIZER
TRADE MARK

A NEW DEVICE
For Repairing Automobile Tires

Vulcar employs a new patented process of vulcanizing, overcoming the many difficulties and dangers existing in all other types of portable vulcanizers.

Vulcar is the only portable vulcanizer which vulcanizes rubber correctly, because it is the only one which supplies the necessary moisture to the rubber while it is being vulcanized, thereby preventing burning or over vulcanizing of the rubber. **It is the only safe vulcanizer for a novice to use.** Any boy can operate the **Vulcar,** it is so simple and easily understood.

Vulcanizing Outer Casing on the Car

Do Not Take the Risk of Using Any Other Vulcanizer

Vulcar requires no electric current, therefore you can repair a tire or inner tube anywhere on the road. **No thermometer required**—no watching required. It is AUTOMATIC. Just light the alcohol burner and pay no further attention to it. At the end of *twenty minutes* you have a beautiful job of vulcanizing, as good as can be done in the best repair shops.

Vulcar is small and compact, about 5x8 inches, and is carried in a neat hardwood box, or leather case, ready for instant use. It vulcanizes tires on or off the wheel. It will save any automobile owner its price several times every year.

Your Money Back!

If your dealer cannot supply you send $12.50 and we will send you a New Process Vulcanizer by express, prepaid. Use it thirty days and if it is not exactly as represented send it back and we will refund your money. *None returned to date!* Every user an enthusiastic endorser.

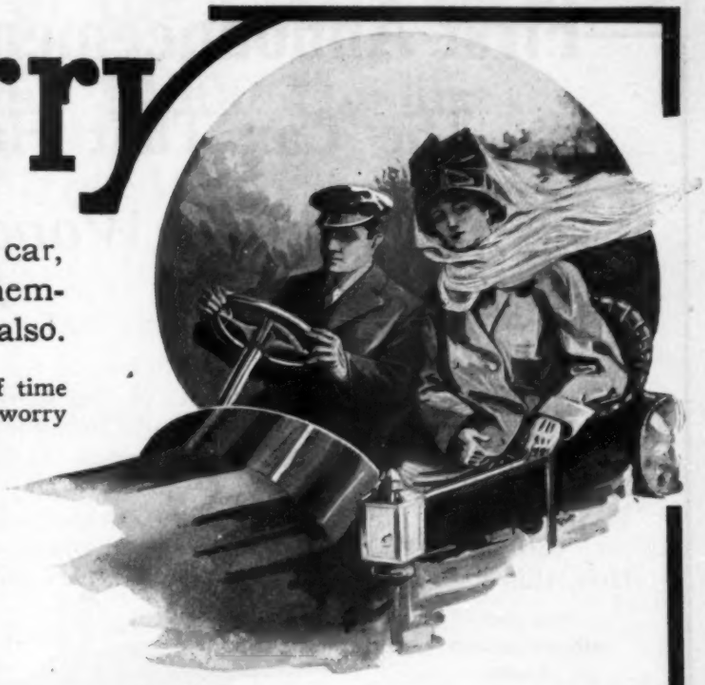
References: Second National Bank, National Bank of Commerce, First National Bank, and Northern National Bank, all of Toledo, Ohio.

Vulcanizing Inner Tube

Vulcanizing Outer Casing

The New Process Vulcanizer 3232 Monroe St. TOLEDO, OHIO

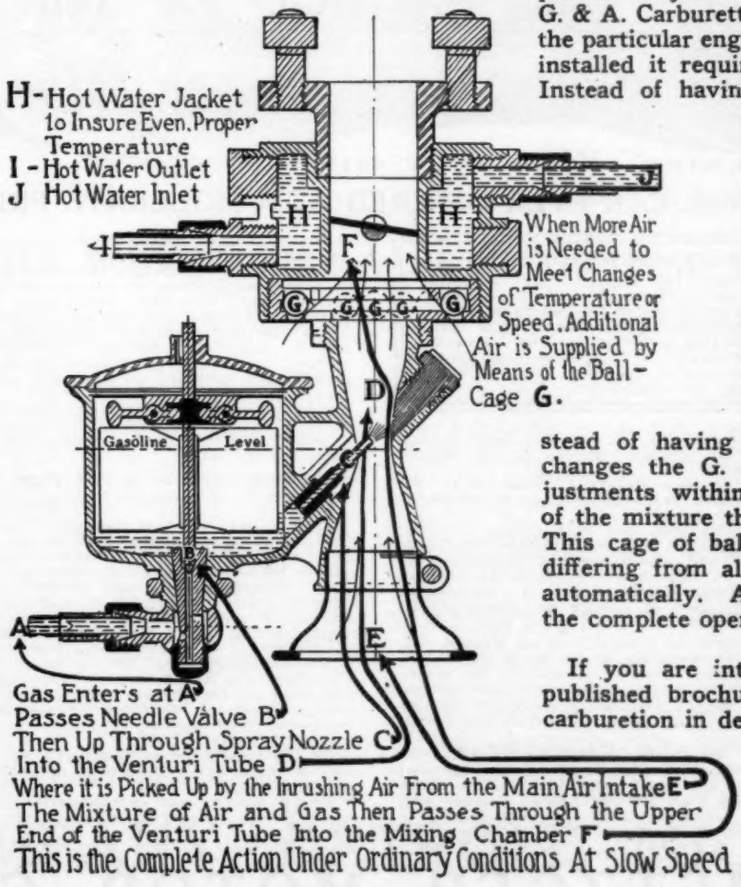
Don't Worry



Put a G. & A. Carburettor on your car, and you will become one of the members of the "Don't Worry Club" also.

If you have driven a car for any length of time you know that one of the greatest causes of worry is carburettor trouble. For no matter how perfectly in adjustment your carburettor may be (unless it is a G. & A. Carburettor) it remains in this condition only a short time, until the variation in external conditions calls for another set of adjustments. With a G. & A. Carburettor it is different. There is nothing to adjust on the Carburettor. All the requirements of changed conditions are taken care of by the construction of the carburettor itself.

It doesn't make any difference whether you are going fast, or slow, whether the air is hot or cold or whether it is wet or dry, the G. & A. Carburettor is always in adjustment. Simply put it on your car and forget it is there. Every G. & A. Carburettor is made to fit the requirements of the particular engine upon which it goes, and once it is installed it requires absolutely no further attention. Instead of having to depend upon each individual person for its adjustment to varying conditions, the G. & A. Carburettor automatically obtains its right mixture by means of the ball cage shown in the cut below.


H - Hot Water Jacket to Insure Even, Proper Temperature
I - Hot Water Outlet
J Hot Water Inlet
When More Air is Needed to Meet Changes of Temperature or Speed, Additional Air is Supplied by Means of the Ball-Cage G.
Gasoline Level
Gas Enters at A
Passes Needle Valve B
Then Up Through Spray Nozzle C
Into the Venturi Tube D
Where it is Picked Up by the Inrushing Air From the Main Air Intake E
The Mixture of Air and Gas Then Passes Through the Upper End of the Venturi Tube Into the Mixing Chamber F
This is the Complete Action Under Ordinary Conditions At Slow Speed

A G. & A. Carburettor when it is put upon your car is permanently adjusted in and of itself to meet the requirements of ordinary conditions just the same as any other carburettor. But when the conditions change, as they do constantly, instead of having to make adjustments to meet the changes the G. & A. Carburettor makes those adjustments within itself, by changing the character of the mixture through the medium of the ball cage. This cage of balls is simply an auxiliary air intake differing from all others in that it operates entirely automatically. A glance at the cut herewith shows the complete operation of the G. & A. Carburettor.

If you are interested kindly send for our newly published brochure, which goes into the subject of carburetion in detail.

G. & A. Carburettor Co.
244-250 West 49th Street
New York City

—First Announcement of the 1912 Everitt

The Car That Has Bridged the Gap Betw

Two Wonderful Models—a "Six" Finest Materials and

For more than eleven years the builders of the Everitt have manufactured successful cars. Their running today in every corner of the world; each new model a little better than the last, and

Two years ago "The Everitt" was first brought out. It leaped into prominence in a moment. Of rad manufactured throughout in a single factory by a wonderfully exact system of infallible "jigs of the day.

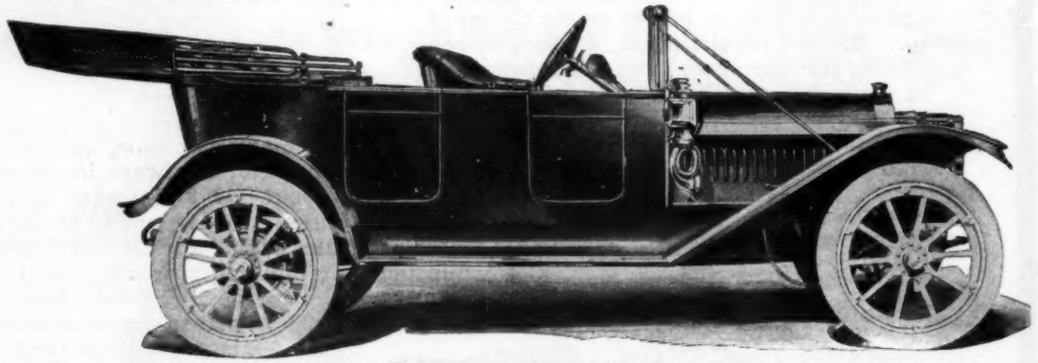
In 1911 further great improvements were made. In the "New Everitt" was offered an intrinsic automobile possible—regardless of price—was their ultimate goal.

How this has been attained—and what is now available in this marvelous 1912 Everitt—we tell

The 1912
SIX-CYLINDER
Everitt

6-Cylinder, 48 H. P., Long-Stroke Motor; Chrome-Nickel Steel throughout; 36 x 4-inch tires; Demountable Rims; Cellular Radiator; 126½-inch Wheel Base; Everitt Self-Starting Device, Top, Windshield and Speedometer included; Dual Ignition; Manufactured complete in one factory.

Price, $1,850.



DELIVERIES AFTER JULY 15th

THE FIRST CHROME-NICKEL STEEL CAR EVER OFFERED AT A MODERATE PRICE

In planning the new Everitt instructions were given to William Kelly—that dean of Automobile Engineers—to produce the very best that his great experience, judgment and ability knew.

Desirable proven features were adapted to the new design. A hundred details were improved, strengthened, simplified.

The motor—already a whirlwind of power and a marvel of simplicity—was given a full third more power.

Then it was seen that one more barrier separated this car from the $4,000 quality.

The one great intrinsic difference was in the steel. Like other good automobile manufacturers, we had been using selected "open-hearth" or "carbon-steel." There is one thing immeasurably better—but far more costly, the price-ratio being about four to one. As compared with common automobile steel, its value is as six to one. It is "Chrome-Nickel" Steel.

Any good engineer will tell its unparalleled properties; how it indefinitely resists crystallization, and has bending and breaking limits of three to one over ordinary steel; how in an automobile it is practicaly unbreakable and unwearable.

Conceive what it means to a car to be manufactured throughout, like the New Everitt, of this peerless steel.

On the word of a great steel expert, no car in the world selling below $3,000 uses an amount of chrome-nickel steel equal to the Everitt.

THE EVERITT SIX

The Six-Cylinder type is now regarded as the very highest development of automobile building. It has long been considered the special province of high-priced builders.

In the New Everitt Chrome-Nickel Six we present a car which has no competition below $3,000.

No one who has ever driven a "Six" will question the remarkable efficiency, power and smoothness of operation offered in this type. There is an overlap of power-impulses and a consequent smooth flow of energy as uninterrupted as the flow of water from a pipe.

There is no vibration in an Everitt Six, no gear-changing in traffic or on a hill, no lack of speed or power for an emergency. Note the size, power and equipment of the Everitt Six. Never has so great a value been offered in any car.

The Everitt self-starting device

Both the Everitt "Six" and the Everitt "Four-36" will be equipped, at their respective prices of $1,850 and $1,500, with the Everitt self-starting device. The Everitt "Four-36" is the first four-cylinder car of moderate price to have such an equipment.

THE NEW "EVERITT FOUR"

In the New Everitt Four is presented one of the most desirable medium-sized Touring Cars at any price. Larger and more powerful than the 1911 model, it represents the best ideas of keen engineers who have followed automobile development for eleven years.

The Motor—rated as "36"—has shown 46 actual horsepower for a long-continued brake test. The body lines have been greatly improved and beautified. Larger Tires and Demountable Rims have been added, and the Everitt self-starting device, a Top, Windshield and Speedometer are included as standard equipment.

You are invited—urged—to compare the Everitt "Four" and "Six" with what you consider the best cars of their type, regardless of cost.

THE EVERITT 30 FOR $1,250

(Top and windshield included)

The success of the standard "Everitt 30" has been so marked that at the new price of $1,250 this car is bound to be one of the big sensations of the season.

In appearance, size and power it will be practically unchanged except for refinements and improvements. By the great saving made possible by changed conditions, it has been found possible to lower the price to $1,250. This includes the Top and Windshield. There are a few cars on the market selling at $1,500 which offer the features of reliability, economy and service provided in the standard "Everitt 30."

At the new price of $1,250 this car offers a value never before obtainable for anywhere near its cost.

Every Everitt car carries with it the most liberal factory guarantee ever offered.

METZGER MOTOR CAR

First Announcement of the 1912 Everitt—

een the $1500 Price and the $4000 Quality

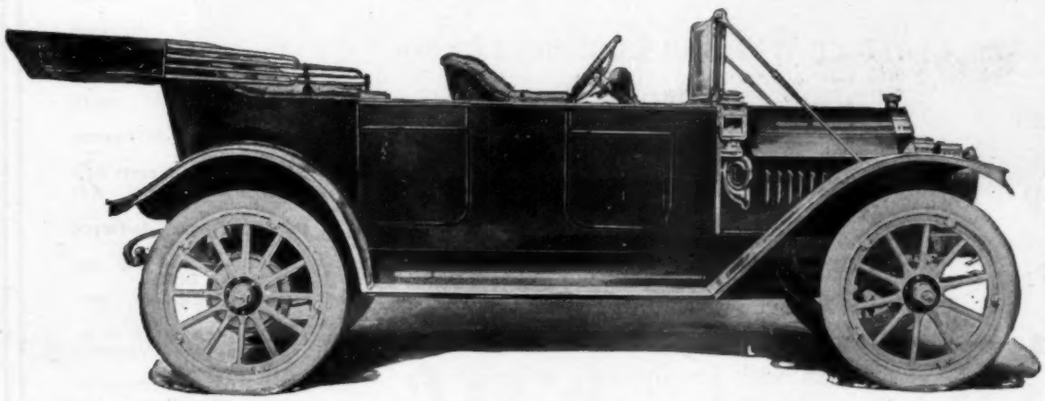
and a "Four"—of the Very Construction Known

names are famous wherever automobiles are known. Their cars—by the tens of thousands—are nearer the ultimate perfection sought from the start.

ically new design, its features the focused experience of three great makers and a hundred dealers, and fixtures," this new car was instantly regarded, by men who knew, as one of the foremost cars

value impossible to excel in any $1500 car. But still the makers were not satisfied. The very finest

you here.



The 1912
FOUR-CYLINDER
Everitt

4-Cylinder, 36 H. P., Long-Stroke Motor; Chrome-Nickel Steel throughout; 34x4-inch Tires; Demountable Rims; Cellular Radiator; 115-inch Wheel Base; Everitt Self-Starting Device, Top, Windshield and Speedometer included; Dual Ignition; Manufactured complete in one factory.

Price, $1,500.

DELIVERIES AFTER JULY 1st

THE MOST NOTABLE NAME OF THE YEAR WHERE EVERITT APPEARS

The name Everitt above a dealer's door means more this year than any motor car trademark ever meant before.

Motor car buyers are quick to distinguish a genuine motor car sensation.

The extraordinary character of the Everitt offerings is so obvious that it tells its own story.

The name Everitt will act as a sales magnet wherever it appears during the ensuing season.

We are well within the facts when we say that no manufacturer in America has ever furnished his representatives with such a magnificent sales argument.

Just consider the potency of the Everitt appeal to the 1912 motor car buyer.

First comes the sensational Everitt Six—an unprecedented price for an unprecedented car at a time when the demand for six-cylinder cars is at its height.

And as if this were not sufficient—the crowning touch of all—the solution of the self-starting principle is incorporated in this car without a cent of additional cost.

Between the Everitt Si xand the six-cylinder cars which it rivals in running qualities and in results, there is a price gap of $2,000 and more.

EVERITT SIX A REAL SENSATION

The Everitt Six, as you have seen by the announcement on the opposite page, is the first Chrome-Nickel Steel car ever offered at a moderate price.

There is nothing ordinary or commonplace about it.

It is a sensation of the first proportions, made more sensational still by the magic appeal of the self-starting engine.

Backing up the Six, and not one whit less sensational, is the 36 H.P. four-cylinder Everitt at $1,500.

NO CAR TO RIVAL IT

In this car are incorporated such invaluable features as a long-stroke motor, Chrome-Nickel Steel construction throughout, 3-4 x 4-inch tires, demountable rims, 115-inch wheel base, dual ignition; with top, windshield and speedometer included.

Check over in your mind the strongest competition this car will be called upon to meet—can you remember a single car which will really rival it?

When you have digested the pulling powor of these two splendid models—from a sales standpoint—turn your attention to the third Everitt offering.

The 30 H.P. four-cylinder Everitt at $1,250 matches in every way the unusual character of its running mates.

There is nothing in its field which can seriously challenge its prestige.

BIG EVERITT ADVERTISING

The name Everitt this year—backed up by a strong and consistent advertising campaign—means more to the dealer than any other name in the automobile market.

It means a continuous stream of inquirers and an army of values to lay before them which no other line can approach, during the forthcoming season.

The Everitt sales organization for 1912 will be one of the soundest and strongest in the motor car market.

If it so happens that your territory is not included in that splendid organization, do not lose a moment in getting in touch with the factory.

COMPANY, DETROIT, MICH.

A Year Ago We Began Talking About

Fisk Service

Which Was and Continues to be Unique

THE FISK LINE

Automobile Tires
(Heavy Car Type)

Clincher

Q. D. Clincher

Fisk-Dunlop

Bolted-On

Inner Tubes

Removable Rims

Tire Sundries

Repair Materials

Repair Dept. Equipment

EACH Fisk Branch is equipped to care for every phase of the tire business.

As each Branch is in charge of a direct factory representative with authority to meet requirements of tire users, we eliminate delay coincident with the necessity of conferring with another Branch or with the Factory.

Each Fisk Branch carries a full line of Fisk Tires in all styles, inner tubes, tire sundries, repair materials, etc.

Each Fisk Branch has a completely equipped Repair Shop where tires of any make are repaired promptly at prices that are right.

In a word, when you deal with a FISK BRANCH you deal with the FISK FACTORY and not with a sub-branch or storage depot.

Direct Factory Branches

BOSTON — 811-13 Boylston St.
PROVIDENCE—17½ Dorrance St.
SPRINGFIELD, MASS.—135 Bridge St.
HARTFORD—292 Asylum St.
NEW YORK—1725 Broadway.
PHILADELPHIA — 258 North Broad St.
BALTIMORE—105 West Mt. Royal Ave.
ATLANTA—17 Houston St.
NEW ORLEANS — 619 Baronne St.
SYRACUSE — 441 South Warren St.
ROCHESTER—34 Clinton Ave. South.
BUFFALO—718 Main St.
CLEVELAND—2037 Euclid Ave.
DETROIT—262 Jefferson Ave.
CHICAGO — 1440 So. Michigan Blvd.
MILWAUKEE—456 Milwaukee St.
INDIANAPOLIS — N. Delaware and Vermont Sts.
ST. LOUIS—3917 Olive St.
MINNEAPOLIS — 820 Hennepin Ave.
ST. PAUL — 160 West Sixth St.
FARGO—405-7 N. Pacific Ave.
KANSAS CITY, MO.—1601 Grand Ave.
OMAHA — 2210 Farnam St.
DENVER — 1635 Broadway.
SEATTLE — 910-14 East Pike St.
SAN FRANCISCO — 418 Golden Gate Ave.
OAKLAND—168 Twelfth St,
SACRAMENTO — 1310-12 K St.
FRESNO—1362-4 I St.
LOS ANGELES—722 South Olive St.

The Fisk Rubber Company
Department C **CHICOPEE FALLS, MASS.**

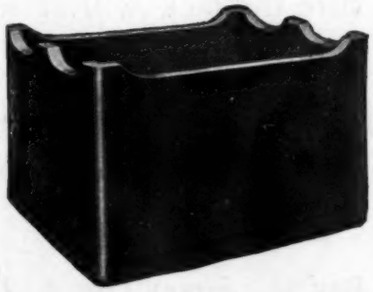
Direct Factory Branches in 30 Cities

60-70
6 Volt.

The Witherbee Battery

Recharged Free at All Our Branches

HAS the greatest capacity of any so-called "sixty" on the market. Perfect for Side and Tail Light Illumination. Find out why the new "splash-cover" construction insures the maintenance of rated capacity.



The Witherbee protection sleeve is not only renewable at small expense, but does not come in contact with acid on the charging bench.

WITHERBEE IGNITER CO.

Springfield, Mass. New York Chicago Detroit

Coast Representatives:
WEINSTOCK NICHOLS CO., San Francisco, Cal.

Use a Hartford and Take it Easy

Owners swear *by* the Hartford—not *at* it. So strong and sturdy in construction it's never out of order; so scientifically built, a pressure of only *15 pounds* on the handle lifts *1,000 pounds* on the rack. Combines the "long arm" and "short stroke" principles.

Hartford Auto-Jack

Sold by Dealers Everywhere

Almost every dealer sells the Hartford—but if yours does not, don't listen to a "just as good" argument but send us the price and we'll ship a Hartford with a money-back guarantee if you're not pleased.

PRICE, complete with strong canvas containing-bag ... **$8**

The Hartford Jack has *three* times the lifting power of the ordinary jack. It is made of finest materials obtainable, handsomely finished and has a *mechanical reversing device* so you're always sure the jack will raise or lower the car, whichever you want.

Your Hartford Jack is never out of commission—never broken. It gives life-long service—always ready—always right.

Hartford Suspension Co., 140 Bay St., Jersey City, N. J.

EDW. V. HARTFORD, President

New York: 1700 Broadway; 212-214 West 88th St. Chicago: 1458 Michigan Ave.
Boston: 325 Columbus Ave. Philadelphia: 1437 Vine St.
Newark: 289 Halsey St.

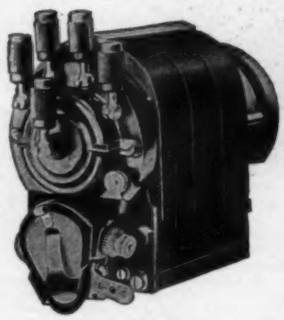
REMY MAGNETO

Makes a Perfect Record in World's Greatest Contest

Ray Harroun, Marmon, Winner

Every Remy-equipped Car entered in the Five-Hundred Mile International Sweepstakes Race on the Indianapolis Motor Speedway was running at the finish. Here's what the drivers say—

"Perfect ignition. We never lifted the hood during the all-day grind. The Remy Magneto never missed a shot."
Ray Harroun.



Remy Magneto

Chas. Merz
National, Seventh

"Remy Magneto worked perfectly. Not one bit of ignition trouble." *Chas. Merz, National, Seventh.*

Howard Hall
Velie

"The Remy furnished perfect ignition. We never suffered magneto troubles or made any adjustments." *Lee Frayer, Firestone-Columbus.*

Lee Frayer
Firestone-Columbus

"No trouble with Remy ignition. The magneto worked perfectly and delivered a hot spark the entire time."—*Ernest Delaney, Cutting.*

Bob Burman
Benz

"Ignition was perfect. Remy entirely satisfactory. No trouble of any kind." *Howard Hall, Velie.*

"Spark from Remy Magneto perfect at all times. Remy proved its superiority. Our ignition was absolutely faultless." *Bob Burman, Benz.*

Ernest Delaney
Cutting

"Remy on my car gave perfect satisfaction. My hearty recommendation for the Remy Ignition." *Billy Knipper, Benz.*

Billy Knipper
Benz

"Perfect ignition" in a long, gruelling contest under most severe conditions means the same for you in everyday automobiling.

Specify Remy Equipment Upon YOUR Car

Remy Electric Company

Factories **Anderson, Indiana** Gen'l Offices

New York Boston Detroit Chicago Kansas City
San Francisco Indianapolis
Minneapolis: Hollis Electric Co. Philadelphia: McCullough & Son
Denver: Auto Equipment Co.

TIRE PROTECTION WITH A GUARANTEE

Yes!—I mean every word I say, when I guarantee you 10,000 miles service on every 1911 "BRICTSON" Heavy Car Type Tread, and I will positively make good my guarantee. I have been studying this Tread proposition for the last six years and have devoted the best of my life in perfecting this wonderful tread. Yes! Wonderful, that is just what I mean and I am not afraid to look you square in the face when I say it.

Mr. Motorist, you cannot afford, as a matter of economy, to run your car without using the 1911 "BRICTSON" Detachable Heavy Car Type Tread, when I am offering you a guarantee of

10,000 MILES

WRITE FOR A COPY OF MY GUARANTEE

Let me prove it to you, by the hundreds of letters in our files from satisfied customers that are just as enthusiastic over BRICTSON DETACHABLE TREADS as I am. While dictating this advertisement to my Edison Business Phonograph, a letter from one of our customers was laid on my desk, which letter all must be compelled to believe, for it was absolutely unsolicited and from a man with a high moral standing, as his calling will indicate. The letter reads as follows:—

METHODIST EPISCOPAL CHURCH,
Rev. L. S. McKown, Minister.

Vienna, Ill., March 15, 1911

O. A. Brictson, Pres.,
Brictson Mfg. Co., Brookings, S. D.

Dear Sirs:—I have been using the Brictson Tread on a Buick car for over two years, and I find that they give entire satisfaction. Since coming to this city I find every other Tread except the Brictson, and I am desirous that my friends get the best, hence I write for the agency, and your best net prices. And in order that I may be the first in the field here, please ship me by return Express, one set (4 Treads) of Brictson Detachable Tire Treads for tires 32x3½. Ship C. O. D.

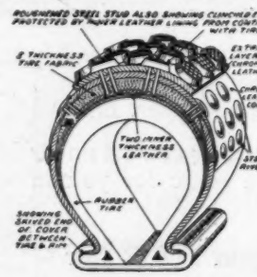
Yours Very Truly, L. S. McKown.

Right here I want to say that the treads referred to in the above letter were made two years ago, when we were in the experimental stage, and which goes to prove, even though our treads were not perfected at that time, the principle was absolutely right. Think of a man running a car equipped with the same tires for two long years, all the while under "BRICTSON" DETACHABLE TREADS, and then ask yourself, "Do they rot the rubber tires?" I want to tell you, gentlemen, that this rotting, heating, burning, creeping, stretching, and injuring the rubber casing that you have heard so much talk about is all "bosh" with the Brictson, and I can prove it, not only by the above unsolicited letter, but by hundreds of others, copies of which will be gladly forwarded upon request.

Brictson Detachable Tire Treads

"The Enemy of Tire Expense"

The cross section illustration on this page represents the construction of the BRICTSON Heavy Car Type Tread. First there is a layer of specially tanned, extra pliable chrome leather. On the tread part outside of this leather is another strip of chrome leather, which entirely covers the tread surface that is exposed to the road. Next to these two thicknesses of leather are five layers,—did you get that?—five layers of the very best quality tire fabric. It would be an easy matter for us to use one, two, three or even four layers of tire fabric in order to save money, but we have found from years of experience that it is absolutely necessary to use not less than five layers of tire fabric to obtain perfect strength and to prevent the tread from stretching, that is why we use five layers of tire fabric. A tread made without sufficient fabric would be worthless on account of stretching, causing it to sag and become loose on the rubber casing. That is why all rubber casings are constructed of fabric the same as we are using, for tire manufacturers have found from years of experience that tire fabric is the only material that will keep a tire together and not allow it to stretch out of shape, but we go still further; we use several layers of leather, thereby gaining considerable strength.


ROUNDHEAD STEEL STUD ALSO SHOWING CLINCHED END PROTECTED BY INNER LEATHER LINING FROM CONTACT WITH TIRE
EXTRA LAYER OF CHROME LEATHER
CHROME LEATHER COVER
TWO INNER THICKNESS LEATHER
STEEL RIVETS
RUBBER TIRE
SHOWING BEVELED END OF COVER BETWEEN TIRE & RIM

Next to these five layers of tire fabric is another layer of chrome leather. Please note that through the outer layers of chrome leather and then through the five layers of tire fabric, the large beveled head steel studs and steel rivets are driven. These studs and rivets are clinched into another layer of leather which immediately follows next to the tire fabric, and then there is yet another layer of chrome leather, which covers the clinched ends of the studs and rivets and prevents them from coming in contact with the rubber tire.

Is there any wonder then that users of "BRICTSON" DETACHABLE TREADS say they are the best tire protectors in the world? And you must certainly admit it after you have read and studied the foregoing construction and illustrations.

TO DEALERS

We are going to establish an exclusive agency in every city and town and have a very interesting proposition to offer. Fill out and mail coupon to the left and immediately upon receipt of same I will mail you my new 1911 catalogue together with my exclusive agency proposition and contracts for your approval. Don't delay! Write today, for we give only one exclusive agency in each place.

O. A. BRICTSON, President

The Brictson Mfg. Company

261 Brictson Building
BROOKINGS, SOUTH DAKOTA

DEALER'S COUPON.

O. A. Brictson,
President,
The Brictson Mfg. Co.,
261 Brictson Bldg.,
Brookings, So. Dak.

Without obligation on my part, send me your Exclusive Agency Proposition, 1911 Catalogue and Dealer's Folder.

Name .....
City .....State .....
County .....

MOTORIST'S COUPON.

O. A. Brictson,
President,
The Brictson Mfg. Co.,
261 Brictson Bldg.,
Brookings, So. Dak.

I am interested and would like to know more about "Brictson" Detachable Treads. Send me your booklet, "The Enemy of Tire Expense," Proofs from Automobile Owners, Prices, etc.

Size of Tire.....
Name .....
Address .....
Dealer's Name .....

Mosler SpitFire
BREECH BLOCK TYPE
FORD AND BUICK
OWNERS TAKE NOTICE
!!!
THE PLUG WITH THE HANDLE
IS THE BEST PLUG FOR YOUR CARS
BECAUSE IT MAKES PRIMING EASY
EASY TO TAKE OUT
EASY TO CLEAN
EASY TO PUT BACK
WRITE FOR INTERESTING BOOKLET
A. R. MOSLER & CO., 163 WEST 29TH STREET NEW YORK

HB OWF

HESS-BRIGHTS

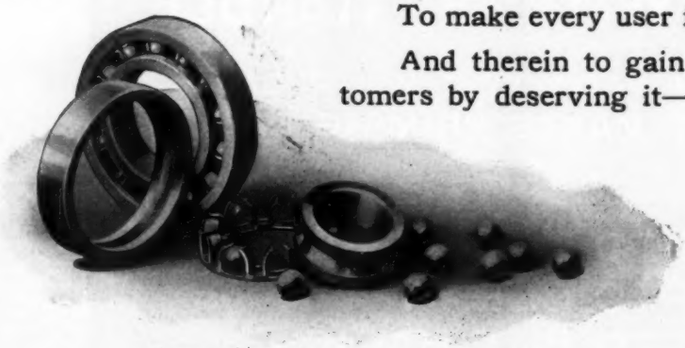
To Do One Thing Well—

To apply the results of science to human affairs—

To aid in making the automobile a vehicle of every-day usefulness, a saver of time, a giver of health to tens of thousands—

To give certain economy for uncertain expense, in upkeep and repairs—

To know how to make ball bearings that shall last as long as most cars, and to make them a little better than the best that have been made—



To make every user feel that his interest is ours—

And therein to gain the hearty good-will of our customers by deserving it—

That seems to us an ambition worthy to engage our whole-souled endeavors. It is the ambition in which HESS-BRIGHT Ball Bearings are made and sold.

RETAIL DISTRIBUTORS

NEW YORK CITY, The Hess-Bright Co., 1974 Broadway.
CHICAGO, ILL., The Hess-Bright Co., 1800 Michigan Ave.
BOSTON, MASS., The Post & Lester Co., 288 Devonshire St.
BOSTON, MASS., The Post & Lester Co., 16 Park Sq.
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LOS ANGELES, CAL., Chanslor & Lyon Motor Supply Co., 945-7 S. Main St.
FRESNO, CAL., Chanslor & Lyon Motor Supply Co., 1246 J St.
SEATTLE, WASH., Chanslor & Lyon Motor Supply Co., 916 E. Pike St.
SPOKANE, WASH., Chanslor & Lyon Motor Supply Co., 1405 First Ave.

THE HESS-BRIGHT MANUFACTURING CO. 2108 Fairmount Avenue PHILADELPHIA, PA.

EVENTUALLY the truck that wise purchasers will buy will be the one built by an organization whose *sole aim* is to build a *commercial* vehicle—one whose *entire effort* in design, construction, selling and "after service" is spent in giving the owner a *money saving vehicle;* not a remodeled pleasure car or a machine whose up-keep expense increases in a geometrical ratio.

It is admitted that all commercial motor vehicles, like all automobiles, need adjustment, but the amount, character and ease of such adjustment determines its cost and hence the relative value of the truck.

The question of cost of maintenance and ease of adjustment is more important than the first price of the truck.

The Universal Motor Truck Company was organized for the express purpose of manufacturing, selling and suitably maintaining economical and efficient commercial vehicles.

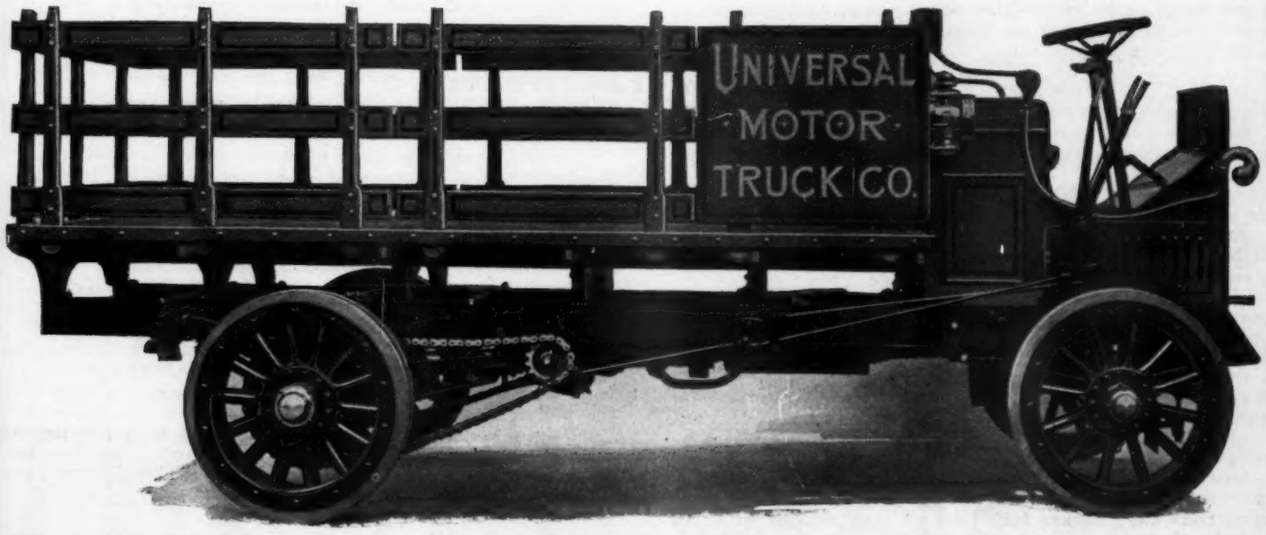
They have given the question of maintenance and adjustment very careful consideration.

The following enumeration of some of the distinctive points in Universal design will readily convince the purchaser or dealer of the pertinence of this statement:

Pleasure car practice has been entirely forgotten.
Universal trucks designed for trucking only.
Three unit idea of design makes for great accessibility and ease of adjustment.
Small loss of time necessary for this work.
Overhead type of design makes motor very accessible—can be reached from front and sides of body, also through floor boards, and at the same time allows use of short wheel base, short overhang on rear axle.
This means even distribution of load.
Low frame allows ample room for general inspection of all mechanism underneath body at any time.
Three point suspension of motor unit and jack shaft differential clutch unit allows perfect flexibility under severest conditions.
Radiator is mounted on springs in protected position just back of motor, and is cooled by direct current of air thrown from the Sirocco fan contained in the fly-wheel.
The long stroke motor, developing great power and slow speeds.
Ball governor on motor, non-accessible to driver, limits speed 12 miles per hour.
The entire mechanism is of extra heavy design to stand hard usage.

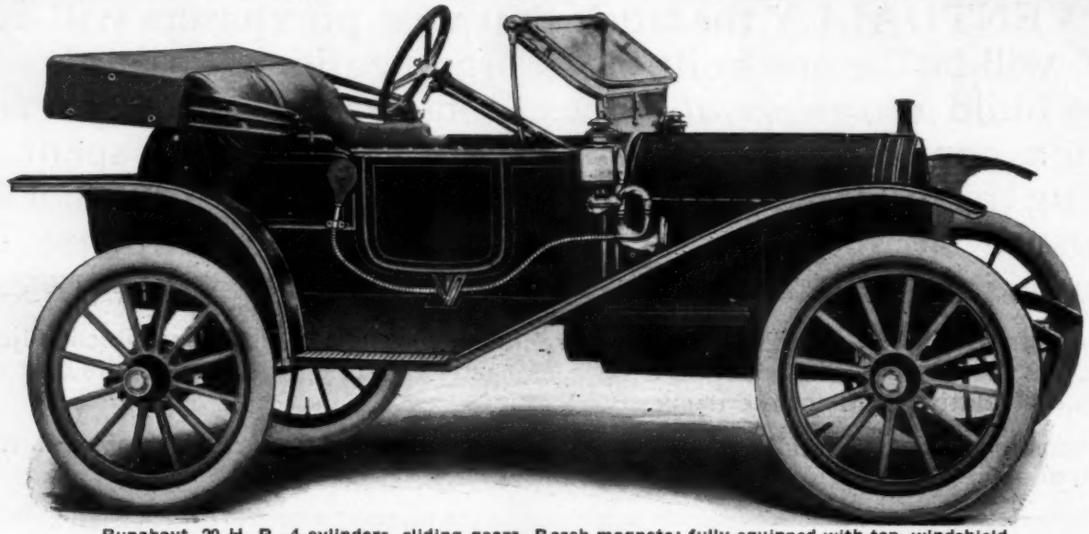
"Built on the three unit plan."

Universal Motor Truck Company, 509 Theodore Street Detroit, Michigan



Universal 3 Ton Truck

Hupmobile 1912 Announcement



Runabout, 20 H. P., 4 cylinders, sliding gears, Bosch magneto; fully equipped with top, windshield doors, gas lamps and generator, three oil lamps, horn and tools—$750 F. O. B. Detroit.

Runabout
Fully Equipped

The 1912 Fore-door **Hupmobile**

$750
F. O. B. Detroit

GUARANTEED FOR LIFE

ALL PRICES INCLUDE COMPLETE EQUIPMENT

We believe that in this new 1912 fore-door Hupmobile, fully equipped for $750, you get infinitely more than you have ever been offered before.

We have always asked you in the past to compare the Hupmobile with the costliest cars of largest size; and we shall never recede from that position.

But in order that you may be quickly convinced, we are willing that you should set aside, for a moment, the question of quality.

We are willing that you should forget the twenty-eight important improvements incorporated in this new car, and printed on this page.

To get down to bedrock—pick out any car of lower price; and add to that price the money value of the 1912 equipment of the Hupmobile.

When you've made it plain to yourself that even in point of price this new car is the most extraordinary thing that has ever happened in motordom, get back to the only question that counts—the question of quality—and study this page to see what your Hupmobile dealer offers you.

Into each and every Hupmobile model for 1912 have been incorporated entirely new elements of value.

The legitimate savings of an immensely increased production—these are passed on to you in the form of a structural, mechanical and incidental equipment, never before offered in a car at anything like this price.

Study the list of 1912 improvements. Consider what you get; and what you pay. Remember the flawless reputation of the Hupmobile—its immense popularity not only with men of moderate means, but men of wealth and experience in every community.

1912 Improvements

An auxiliary inverted top-leaf spring placed between the frame and rear spring, to prevent listing of body.
Old ball bearings back of driving pinion replaced with Timken bearings.
Four pinions instead of two on the differential.
Rear axle shaft tapered into and keyed onto the wheel—cannot work loose.
Ball bearings on either side of differential replaced by specially designed Hyatt roller bearings.
Axle shaft babbitted near brake, so that no grease can escape.
Ten-inch double internal expansion brakes instead of eight-inch.
Adjustable ball housing for universal joint.
All spring hangers fitted with oilers.
Timken roller bearings on front wheels.
Supporting seat for front spring. All springs made of Vanadium.
New pressed steel radiator, lined with brass, with 33⅓ per cent more efficiency in cooling.
Improved water outlet to engine.
Radius rods have square lock nuts on transmission ends, to make them more easily adjustable.
Double springs on the foot brake pedals.
Steel flywheel guard.
New square dash and hood ledges of natural walnut.
Nine-inch guards instead of six-inch; and mud shields completely enclosing space between wheels and fenders.
Running boards of pressed steel, supported by two drop-forged irons.
Magneto encased in a Rubbertex cover.
Hub caps of real brass; stronger and better.
Large timing gears of bronze instead of fibre.
Valve adjusters on all valves maintain timing longer under all conditions; make timing quickly adjustable and prevent engine power from decreasing.
All cast-iron used on the car sand-blasted to give smoother surface and keep grit out of gears and bearings.
Improved Breeze carbureter—will not leak, and is accurately and easily adjusted.
Cam-action oiler on the engine regulated with the throttle and gives a positive feed. You get more oil as you need it and as the engine develops power. This feature peculiar to high priced cars of foreign make.
Inside drive on the side-door models.
Fore-doors included as regular equipment with no extra charge; also top, windshield, and gas lamps and generator.

Hupp Motor Car Company, 1252 Jefferson Ave., Detroit, Mich.

PREMIER

PREMIER 6-60 CLUBMAN

The Proven Car of Quality

The Premier Car has done more to prove its worth and reliability than any car in America

For a period of nine years Premier cars have been foremost among those automobiles which have established a standard by which motor cars can be judged. In 1902 the first Premier car appeared and was the first car in this country with a pressed steel frame, the first with shaft drive, the first with a one-piece drop-forged front axle, and one of the first two makes with sliding gear transmission. The ascendancy of the Premier at that time has been constantly maintained.

Premier cars have long been prominent in endurance contests and have consistently shown themselves to be the superiors of superior cars. The Premier is the only make which in any three of the last four Glidden tours, or all four of them, has not lost a car and has finished with every car that started. The Premier won the Standard Oil trophy for gasoline economy, not only upon the weight-mileage basis but also because it actually used less gasoline than its competitors.

The Premier won the Philadelphia-Wilkes-Barre midwinter run, one of the most rigorous contests ever conducted, and was the only car to finish with a perfect score. This Premier record, namely, the only car which has ever come through a scrutinizing technical examination after a strenuous contest, with a perfect score, still stands.

Moreover, over 84 per cent. of the people who have purchased Premier cars in the last four years are still driving Premier cars—a record of satisfaction in the hands of private owners.

Facts such as these should be determining factors in the minds of thinking purchasers who look upon a motor car as an investment, and who will consider only motor cars of the highest grade and proven worth.

PREMIER MOTOR MFG. COMPANY

Sales Dept., 314 N. Delaware St. **Factory, Shelby & Georgia Streets**

INDIANAPOLIS

YOU hear a lot about the underslung system of construction nowadays, don't you?

People are beginning to realize its value—manufacturers and owners are giving it more thought—with the result that several prominent manufacturers have adopted this design for their new models.

THE AMERICAN

"A Car for the Discriminating Few"

is the pioneer underslung car and is the only one designed "from the ground up" as an underslung car. It has been "ahead" for five years.

Read what well-informed automobile men have to say in an article on "The Underslung Frame" in the June issue of Motor:

"One very important point for this construction is that it makes possible the use of straight frame side-members, which are better and less expensive than the dropped type. If the motor and gear-box supporting arms are curved downward, a very accessible construction will result, by dropping the motor and transmission well above the frame and sub-frame.

"The lowering of the center of gravity works both ways—either it makes the height of center gravity less with a given wheel size, or makes possible the use of a larger wheel without raising the center of gravity, or a compromise giving both advantages may be reached.

"Since the motor and other parts are above the frame level, a perfectly flat dust-pan may be used. This smooth undersurface will raise less dust than the ordinary type, and the pan would be easier to make, repair, remove or replace.

"In the event of hitting a water-break or other 'hump' very hard, driving the car down on the ground, the frame will strike instead of the flywheel, thus saving the crank shaft from injury. In the event of that very serious accident—a fracture in the front axle assembly—the underslung frame will slide along on the upturned ends and travel somewhat straight, giving the driver a brief but probably sufficient opportunity to stop.

"The very handsome and racy appearance of all the existing exponents of the underslung frame is something which cannot be ignored.

"Almost the first question that comes to our minds in examining a car with the underslung type of frame is, what would happen in case a spring broke. The breaking of a spring is not an uncommon occurrence; in fact, almost every one that has had several years of experiences with a motor car has either broken a spring himself or at least knows someone that has. As a matter of fact, the underslung types are safer in case of spring breakage than are the regular overhung frames, because of the universal employment of upstanding steel 'straps' or yokes secured to the frame and embracing the axle members, so that the possible drop of the frame is limited and the axle prevented from motion forward or back when freed of its spring.

"It would seem, however, from a comparison of the two types that the advantages of the underslung frame far outweigh its poor features.

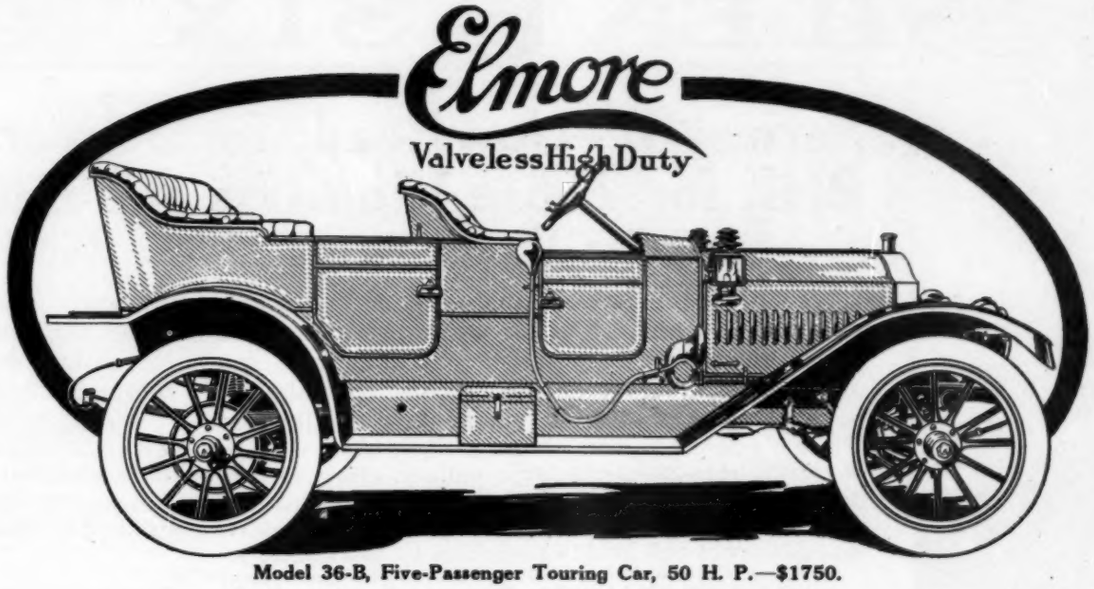
"With this type of frame a lower centre of gravity is obtained than is possible to obtain in any other manner. This makes for safety, as everyone knows, and gives a car less tendency to skid on a slippery road. Other things being equal, it makes a car much easier to guide, as the tendency toward 'weaving' and side sway is largely eliminated.

"The underslung frame permits the use of a smooth underpan which raises much less dust than is usual for a car hung so low.

"All danger from cars overturning is eliminated by the use of the underslung frame. This is because the centre of gravity is so low that it is practically impossible for a car of this type ever to 'turn turtle.' Limousine bodies on the ordinary overhung frames make the centre of gravity high enough so that there is always danger of its overturning at the slightest inclination. But with the underslung frame the limousine body is very well lowered, and safety and beauty are the result."

AMERICAN MOTORS CO., Department 14, Indianapolis, Ind.

Yes, this new Elmore at $1750 gives better service than the best six-cylinder ever built



Model 36-B, Five-Passenger Touring Car, 50 H. P.—$1750.

Go to your Elmore dealer and he will prove to you that the progress of the Elmore engineering principle has produced to sell at $1750 an amazing efficiency not to be found in the costliest six-cylinder car.

There is no doubt that the six-cylinder is the acme of luxury and comfort of the four-cycle type.

If proof of this were needed it has just been furnished by one of the foremost manufacturers of the four-cycle type of car. From this plant comes the announcement of a six-cylinder model—although the management has repeatedly said that the company would not build a car of that type.

The six-cylinder, we repeat, is the acme of luxury in the four-cycle type—but that luxury can only be obtained at a very high price. This, to the minds of a great many people, is in its favor. But a great many others, who would like to enjoy its luxurious qualities, cannot afford to pay the price.

The only alternative left to them is to buy an Elmore; because the Elmore is the only car on earth which not only equals but surpasses the advantages of the best and costliest six-cylinder ever built.

We realize that we are holding out to you a promise which at first glance seems almost impossible of fulfillment.

We realize that you probably consider a six-cylinder car the highest type of efficiency.

It is associated in your mind with the highest possible price—a price, perhaps, beyond your means.

And now we are promising you that we shall surpass the efficiency of the best six-cylinder car ever built in an Elmore which we sell you for $1750.

We are ready, however, for the test—ready to-morrow for its immediate demonstration.

Because we know that in the progress of the unique principle incorporated in the Elmore High Duty Valveless Engine results more and more amazing are being developed every day.

We are serenely conscious of our ability to prove to you that the Valveless High Duty Elmore at $1750 accomplishes all that the costliest six-cylinder car tries to accomplish.

Our catalog points out a few of the privileges which the Elmore owner alone enjoys. These privileges come to him and to him only, in excess of all the comforts which can ordinarily be bought by paying the highest price for any other car.

Send for this catalog—or, better still, see your Elmore dealer.

The Elmore Manufacturing Co., 1304 Amanda St., Clyde, Ohio

Matheson
"SILENT SIX"

Series "B"—Now Ready for Delivery
Built for Those Who Use the Best
This Silent Car Won the World's 24-hr. Record

(1178 miles) for cars costing under $4500, at Brighton Beach, Aug. 19-20, 1910, and 12 first prizes in 12 consecutive contests the same year. The superior qualities which have made possible these unparalleled achievements promise to make the "Silent Six" the most popular of all high-grade six-cylinder cars.

It is a car of accomplishments. You know what to expect of it because of what it has accomplished repeatedly in every sort of public contest and in the private service of hundreds of discriminating owners everywhere. It is the result of many years of successful experience in the development and exclusive manufacture of high grade automobiles by this company.

Prices with open bodies $3500 to $4000; with closed bodies $4700.

MATHESON "BIG FOUR": The current Matheson "Big Four," like its predecessors, is built to endure. For continuous performance under the severest conditions, it has never been excelled.

Write for Catalogue and "The Secret of Silence."

Applications of established dealers considered for open territory.

Matheson Automobile Co.
WILKES-BARRE, PENNSYLVANIA

NEW YORK CITY BRANCH, CORNER BROADWAY AND 62d STREET

DISTRIBUTORS

Chicago, Bird-Sykes Co., 2210 Michigan Ave. Buffalo, Matheson Sales Co., 726 Main St. San Francisco, Matheson Sales Co., Van Ness Ave. and Jackson St. Philadelphia, Johnson Motor Car Co., 326 N. Broad St. Boston, Roy A. Faye Co., 823 Boylston St.

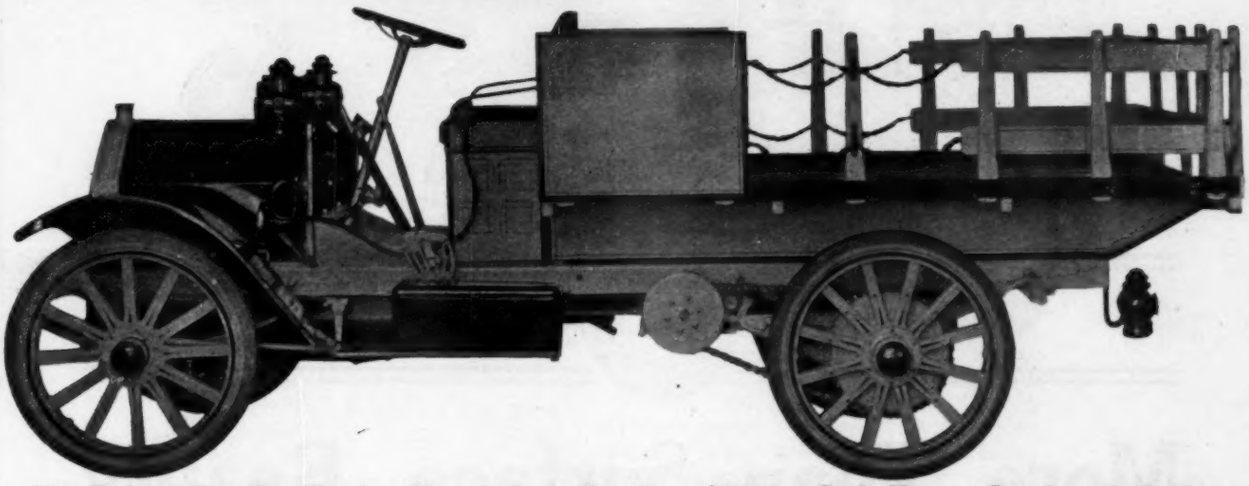
Name .....

.....

Street .....

City .....

A Truck Proved Right By Severest Punishment



The Federal One-Ton Truck—Chassis, Including Seat, $2100. Body Type at Purchaser's Option.

Wheelbase, 110 inches. Weight, 3,200 pounds. Horsepower, 30; four cylinders. Radiator, vertical tube suspended on springs. Bosch high-tension magneto. Clutch, 16-inch cone, leather faced. Selective, three-speed forward and reverse transmission. Timken bearings in wheels. 36-inch wheels front and rear. Pressed steel 7-32-inch frame. 12 x 1½ inch brakes on jack shaft, 16 x 2½-inch on rear wheels. 19-tooth front sprocket, 46-tooth rear.

FEDERAL ONE TON TRUCK

In the construction of the Federal truck the usual process is reversed.

It has been quite a common practice in the past to experiment at the customer's expense.

The Federal Motor Truck Company has made haste slowly, by devoting 18 months to development and demonstration.

The Federal in its perfected form represents a truck which has been subjected to every sort of use and abuse which it could possibly encounter.

It has been required, over and over again, week after week, and month after month, to carry excess loads, over roads of every sort through sand and mud and snow.

It has been put through the paces in the hilly cities of the west coast, over the miles of New York streets, and in a score of inland cities.

Every conceivable condition of going and of load has been encountered by the Federal in its rigorous try-out.

We present it to you to-day as a truck that has been proven by the severest sort of punishment.

Of its type and size we believe it to be the strongest truck in the world.

No matter how inexperienced you may be in truck construction, a glance at the chassis will show you that every essential part is made with amazing stoutness.

Every part, too, is within reach of the caretaker's hand. It can be kept constantly in tune by anyone possessing the slightest knowledge of mechanics.

Instead of being over-rated as to power and capacity, it is under-rated.

We sell it to you as a one-ton truck. But it is guaranteed to carry a ton-and-a-half load without a particle of overstrain.

You can easily prove all we have said, if there is a Federal representative in your vicinity, by having a practical demonstration of the truck in your own business.

You at least should write for further information about a truck so remarkable as this is.

We want established, responsible automobile dealers in a number of cities as Federal sales representatives; but we will consider only the applications of those who are prepared to give the proper kind of service to Federal owners. If you are in a position to do this, write us.

FEDERAL MOTOR TRUCK CO., 100 Isabella Street, Detroit, Michigan

SALES REPRESENTATIVES

NEW YORK CITY:
Motors Engineering & Sales Co.,
250 West 54th St.

BOSTON, MASS.:
Whitten-Gilmore Co.,
709 Boylston St.

DETROIT, MICH.:
Thompson Auto Sales Co.

ST. LOUIS, MO.:
Whitman Motor Car Co.,
6900 South Broadway

KANSAS CITY, MO.:
Mutual Auto Co.,
2121 Harrison St.

DES MOINES, IOWA:
Brown, Corley, Ellis Co.

PHILADELPHIA, PA.:
Fischer Motor Car Co.:
311 North 11th St.

SAN FRANCISCO, CAL.:
Standard Motor Car Co.

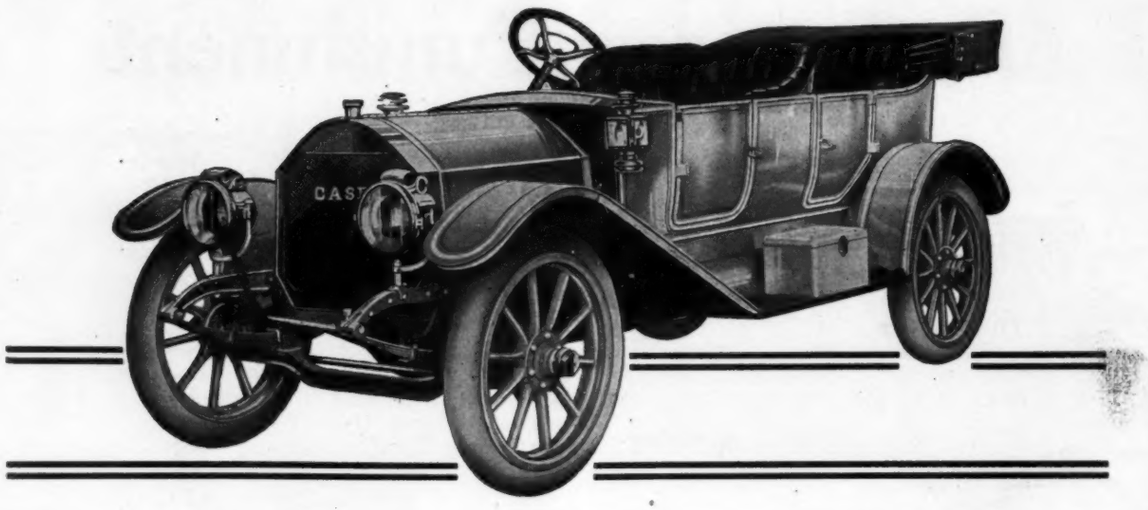
LYNN, MASS.:
C. E. Whitten,
49 Central Ave.

TOLEDO, OHIO:
Atwood Automobile Co.

CAMDEN, N. J.:
The E-M-F Co.

LOS ANGELES, CAL.:
Standard Motor Car Co.

PORTLAND, ORE.:
Stoddard-Dayton Auto Co.



More Than Surface Beauty

Of course your car must be good to look upon. But don't buy it only because it meets with favor in your eyes. It behooves you to look beyond the surface beauty to its real power value.

Case cars are as beautiful in appearance as the highest priced cars made. But it's the power value—the intrinsic superiority of the Case Engine and Chassis—that sells most—

CASE CARS

"The Car with the Famous Engine"

The Case Engine has seventeen years of experience back of it—seventeen years of careful testing, of constant improvement, and of gradual development. Today the Case car, with its famous engine, is all that the motor car enthusiast can obtain.

The Case Catalogue Number 9 will be sent on request.

J. I. Case Threshing Machine Co.
Racine, Wisconsin U. S. A.

Movers of the World's Goods since 1835

To the Wise Men in the Automobile Business

AMERICAN LOCOMOTIVE COMPANY ALCO

Capital $50,000,000

Think of the number of horses in your city. Divide by three and you have the number of motor trucks to be sold in your city.

Someone is going to get this business.

The man who handles the Alco trucks stands a better chance than anyone else.

The American Locomotive Company, builder of the Alco, has been moving the world's goods since 1835.

It has built good locomotives.

And a locomotive is nothing more nor less than a self-propelled vehicle running on steel rails. The locomotive and the motor truck have their origin in the very same vehicle.

Therefore, it is only natural the American Locomotive Company should build motor trucks.

It is logical that the American Locomotive Company should build good trucks.

No one engaged in the manufacture of motor trucks has had a better experience. No one has a stronger organization. No one is in a better physical or financial position.

As evidence of Alco quality, one of the largest transporters of goods, the American Express Company, now has twenty-nine of our trucks in constant service. Twenty-three were purchased on repeat orders. America's large steam and gas fitters supply house, the Crane Company, has eight. Six were purchased on repeat orders. The Gulf Refining Company has fifteen. Thirteen were purchased on repeat orders. Gimbel Brothers, the big department stores of New York and Philadelphia, have thirteen. Eleven were purchased on repeat orders.

This is what some mighty large organizations think of the Alco truck. And please note also that Alco users repeat.

We are looking for live representation in certain territories where we are not now represented. We are looking for business men in the automobile business.

To these we have an interesting and attractive proposition to make.

Our line of trucks is in four sizes, 6½, 5, 3½ and 2 ton models.

We have also a complete line of touring cars—both sixes and fours—which we have been marketing since 1905. The Alco, you will remember, won the Vanderbilt in 1909, and again in 1910!

We offer you either the truck line separately or the touring line separately—or the entirety.

If interested write or wire us. Your communication will receive *personal* attention.

American Locomotive Company

Broadway at Sixty-second Street

New York City

"THIS SHALER Vulcanizer Ended All My Tire Worries"

IN DAYS gone by, whenever I took my car out of the garage, either alone or with guests, I was always uneasy. But now I am never worried, for I know that there will be no tire troubles and that we will be saved the annoyance and danger of blow-outs on the road. I found the way to end all my tire worries when I began to use the

SHALER Vulcanizer

Electric or Alcohol Heated

Going over the tires every little while with this wonderful machine keeps them practically as good as new. No chance for sand pockets to grow into dangerous and expensive blow-outs. The **Shaler** seals up every hole, big or little, in any casing or inner tube anywhere. Makes a perfect weld with live Para rubber. Has automatic heat control—requires no watching—cannot burn or undercure. No other vulcanizer can compare with the **Shaler** in convenience, ease of operation, all around efficiency and low cost of operation.

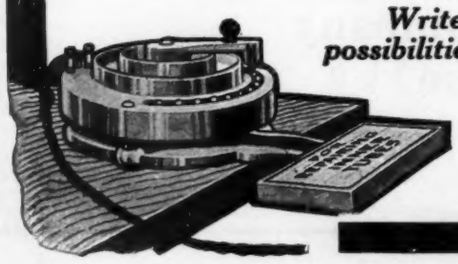
It Makes One Tire Outwear Three

Notice the patented clamping device which allows easy adjustment to any part of the tire, and the convenient side handle—exclusive features found in no other vulcanizer but the Shaler.

For home or garage use with direct or alternating current, or for road use with alcohol. $10 and up. Costs but one-half cent per hour to operate.

You Want This Free Book

An interesting new book for automobile owners, **"Care and Repair of Tires."** Gives a remedy for every tire emergency. Full of just the practical information you want to know. Free for your name if you write today.



Garage and Repairmen:

Write for our free hand-book showing the money-making possibilities of the Shaler Vulcanizer.

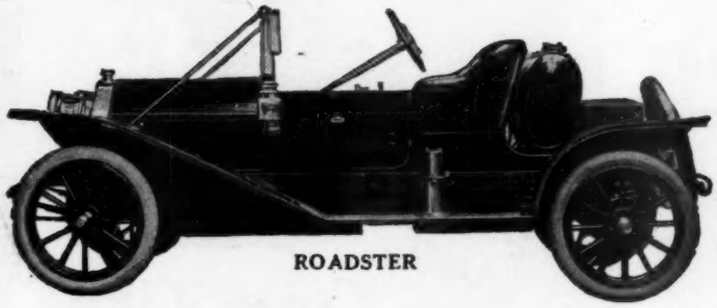
C. A. Shaler Company

125 Fourth Street **Waupun, Wis.**

NEW PARRY $1350

1912 ANNOUNCEMENT OF NEW PARRY CARS

NEW PARRY $1450



ROADSTER

Model 51 $1350

SPEED ROADSTER

(FORE DOOR, TWO PASSENGER)
(With Extra Juvenile Dash Seat)

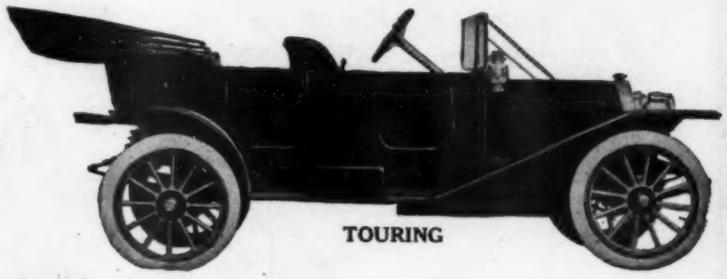
35 Horse Power Motor. Bosch dual system of ignition, Model L Schebler carburetor, 116-inch wheelbase, weight 2300 lbs. Tank, trunk and tire wires. One of the easiest riding cars in America.

Model 52 $1450

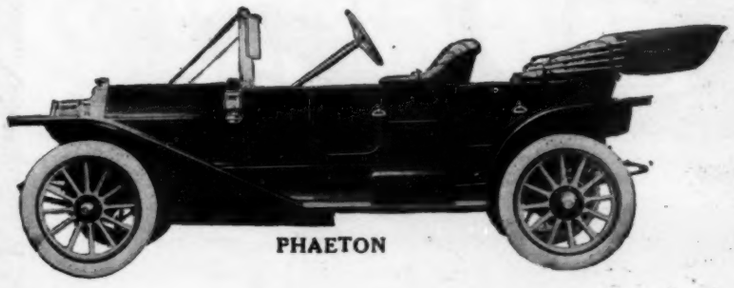
FOUR DOOR TOURING CAR

(Full Five Passenger, Extra Wide Rear Seat)

35 Horse Power Motor. Bosch dual system of ignition, Model L Schebler carburetor, 116-inch, wheelbase, weight 2400 lbs. 34 x 3½ wheels and tires. One of the easiest riding touring cars in America.



TOURING



PHAETON

Model 53 $1400

FORE DOOR PHAETON

(Full Four Passenger, with Extra Juvenile Dash Seat)

35 Horse Power Motor. Bosch dual system of ignition, Model L Schebler carburetor, 116-inch wheelbase, weight 2350 lbs. One of the easiest riding phaetons in America.

***We are shipping our 1912 Models now,* and are in position to take care of our agents on early Fall deliveries**

Write us for 1912 Literature

The Motor Car Manufacturing Co.

Makers

INDIANAPOLIS, U. S. A.

Agents Everywhere

Ask the man who owns one

Packard

MOTOR CARS
1912

The 1912 Packard "Six" Touring Car

Packard Motor Car Company Detroit

MAYO RADIATORS

It's not what we say, but what Mayo Radiators have done, that has led to their adoption by America's best cars.

"What's worth doing at all is worth doing well," is the policy on which Mayo Radiators were built and will continue to be built.

The Mayo Radiator is the Quality Radiator

If you are a quality maker better join our list of customers at once.

MAYO RADIATOR COMPANY, New Haven, Conn.

"PROVED BEST"

SHAWMUT TIRES

TRY ONE

SHAWMUT TIRE CO.
99 BEDFORD ST., BOSTON
Factory: Watertown, Mass.

SILENCE

PEERLESS

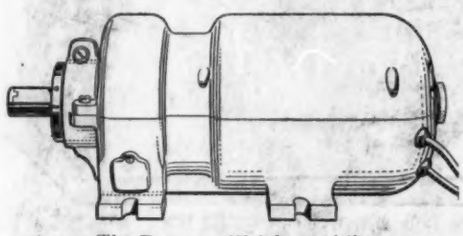
COMFORT

ALL THAT THE NAME IMPLIES

Peerless for 1912

Six-Cylinder Cars $4,000, $5,000, $6,000 Four-Cylinder Cars $4,300

It is logical that a motor car should develop the light that it uses. The Dynamo Electric Lighting System, a part of the standard equipment of the Peerless, accomplishes this, and does away with the inconvenience, the expense and over 50 pounds of the weight occasioned by oil lamps and gas tank.



The Dynamo, Weight 19½ lbs.

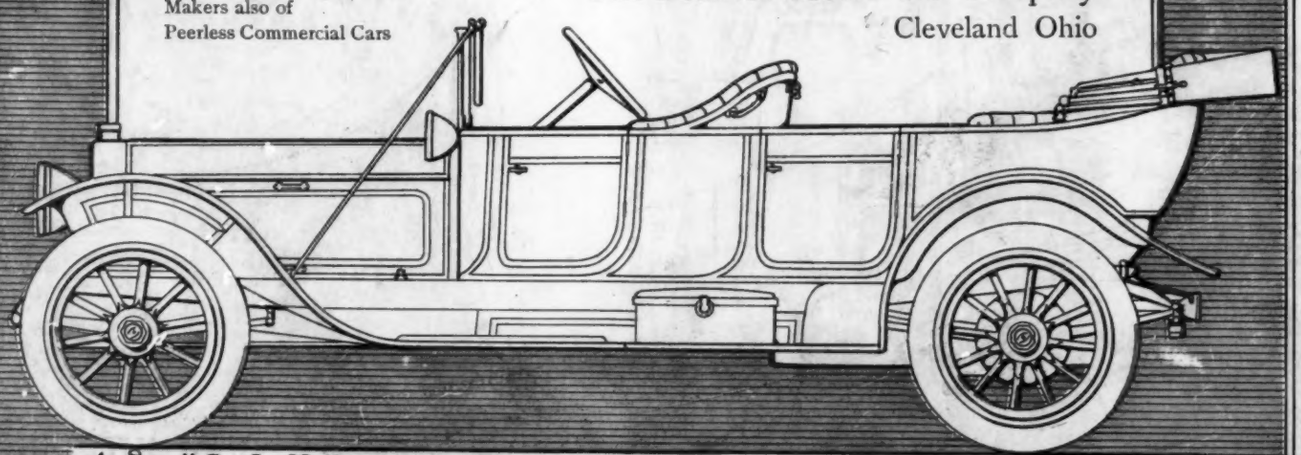
A dynamo, driven by the motor, and governed to a constant speed so that the voltage will not vary, affords a brilliant, effective light for every lamp on the car. When the engine is stopped or running below twelve miles an hour, the lights are fed from a battery which is charged by the dynamo. A cut-out throws the lamps into the battery circuit and back to the dynamo circuit automatically.

Only one-sixth horse power is required to operate the system with all the lamps alight; the running of the car is not effected by the diversion of so small an amount of power. The battery is small and almost never needs attention; there is no re-charging to contend with. The system also provides an emergency current for ignition.

High efficiency, metal filament lamps are used with parabolic reflectors, impossible with a gas flame; they reflect all of the light. Head lights may be changed from powerful, long-distanced beams to divergent, fore-ground rays at will, by means of a simple thumb-screw adjustment. The system is controlled by a simple switch on the dash; it is in complete harmony with the car.

The Peerless Motor Car Company
Cleveland Ohio

Makers also of
Peerless Commercial Cars



48 "SIX" SEVEN PASSENGER